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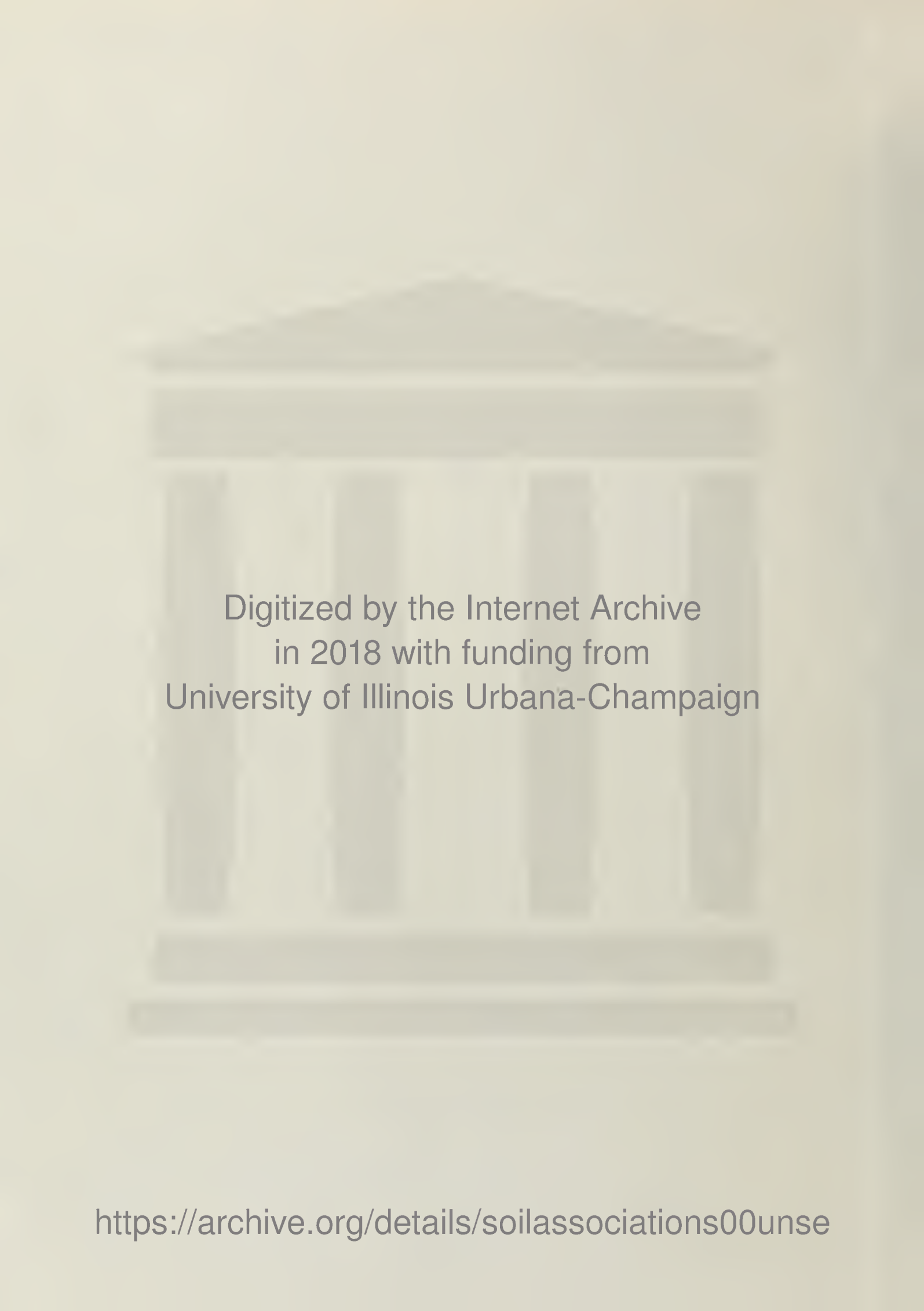
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Prepared by the College of Agriculture, University of Illinois at Urbana-Champaign, in cooperation with the Soil Conservation Service, U.S. Department of Agriculture, and supported in part by Title V Research and Extension Funds, Rural Development Act of 1972. The cover photo is courtesy of the Soil Conservation Service.

Urbana, Illinois April, 1977

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SOIL ASSOCIATIONS OF KNOX COUNTY, ILLINOIS

KNOX COUNTY is located in western Illinois in a grain and livestock producing area. Galesburg is the county seat and largest city. In general, Knox County has productive loess soils, except on the steeper slopes where the loess is thin or absent and glacial till or bedrock outcrops. A third major group of soils in the county occurs in the bottomlands.

The general soil map of Knox County, inserted at the back of this circular, shows the location of groups of soils called soil associations. Within each soil association, several major soils occur in a characteristic pattern. The soils in an association are usually similar in many respects but differ in such things as natural drainage and slope. In most soil associations some minor soils also occur, which may or may not be similar to the major soils; because of their small extent, minor soils have less influence on the overall characteristics and use potentials of the soil associations.

It should be emphasized that the general soil map shows only the general soil conditions in the county. It does not show the detailed location and extent of individual soils on farms and tracts of land as would a more detailed soil map. Therefore, the soil association map is useful for countywide or areawide planning decisions rather than for planning for individual farms.

The soils in each association are described, characterized, and evaluated in the text and tables as to their suitability for various uses. General features and management problems for each soil association are also mentioned.

How To Use the Soil Map and Tables

The soil association areas are identified on the map by a number (the soil association number) and by a capital letter that designates the general slope class of the association. (See the legend accompanying the soil association map and the discussion of percent slope on page 19.) Highways, roads, section lines and numbers, and township and range numbers are also shown to help locate particular tracts of land. After a tract of land is located, refer to the soil association discussions and tables to learn about the soils, their properties, and their suitability for various land uses.

FACTORS INFLUENCING THE SOILS OF KNOX COUNTY

The main factors influencing the present soils of Knox County are soil parent materials, climate, native vegetation, topography, drainage, and the time during which the soils formed. The relationships of the soils in the various soil associations in Knox County to these factors are given in Table 1 (see next page).

Soil Parent Materials

The most extensive soil parent material in the county is loess, a silty and very desirable soil parent material. On the nearly level, uneroded uplands, it varies from about 7 feet thick in the southern part of the county to about 12 or 15 feet thick in the northern part. This loess was deposited during the Wisconsinan glacial stage, which is believed to have ended some 11,000 to 12,000 years ago. The loess soils in the county are, therefore, considered as having formed over approximately 11,000 to 12,000 years.

Many of the stream terraces along Spoon River, particularly the higher lying ones, were covered by the same loess deposits as the uplands. The loess deposits are nearly always thinner on the slopes into drainageways than on the nearly level uplands and frequently have been entirely removed by erosion on the very steep slopes. Glacial till or bedrock underlying the loess is frequently exposed on these steep slopes.

Before the Wisconsinan glacial stage, in which the continental glaciers did not reach as far south as the Knox County area, the Illinoian glaciation covered the entire county. When it receded, it left a thin deposit of glacial till composed of clay, silt, and sand; some pebbles; and a few boulders. The Illinoian glacial till is generally less than 50 feet thick over much of the county. During the Sangamonian interglacial stage between the Illinoian and Wisconsinan glacial stages, well-developed soils formed in the upper part of the Illinoian drift. On nearly level areas, these soils were buried by the later loess deposits; such buried soils are called *paleosols*. Many of these Sangamon soils or paleosols outcrop on slopes; where they are fine textured and slowly or very slowly permeable, they cause side-hill seepage spots that are often difficult to farm and generally not very productive.

Beneath the Sangamon soils and the Illinoian drift occur bedrock and soils formed in bedrock. The bedrock layers are largely shales, siltstones, and sandstones and some limestones of Pennsylvanian geologic age. The Pennsylvanian-age rocks also contain the main coal veins that underlie most of Knox County. The most common bedrock outcropping on steep slopes in the county is shale, which is at places interbedded with thin layers of siltstone and sandstone. Soils formed in these bedrock materials generally have low productivity. Most of them are also too steep to be cultivated and should be used for pasture or forest.

Alluvium deposited on stream flood plains is an important soil parent material in Knox County. Most of these deposits are silty and, in general, have given rise to productive soils. A few relatively small sandy deposits are present in and near the Spoon River valley. Many of the soils formed in these sandy deposits have a low moisture-holding capacity and therefore are not highly productive for such crops as corn and soybeans.

Table 1. Relationship of Knox County Soils in Various Soil Associations to Slope, Parent Materials, Native Vegetation, Surface Color, and Natural Drainage Class

Soil association	Dominant slope	Parent material	Native vegetation	Surface color	Natural drainage class			
					Poor	Somewhat poor	Moderately well	Well
3A	0–2%	Loess more than 5 ft. thick on weathered Illinoian till	Prairie	Dark	Sable Hartsburg Harpster	Ipava		
				Mod. dark	Denny			
3B	2–5%	Same as above	Prairie	Dark Mod. dark	Sable Denny	Ipava	Tama	Tama
3C	5–10%	Same as above	Prairie	Dark			Tama Assumption[a]	Tama Elkhart Assumption[a]
			Prairie-forest	Mod. dark			Downs	Downs
26A	0–2%	Same as above	Prairie-forest Forest	Mod. dark Light	Rushville	Clarksdale Keomah		
26AB	0–5%	Same as above	Prairie-forest Forest	Mod. dark Light	Rushville	Clarksdale Keomah	Downs Clinton	Downs Clinton
26CD	5–15%	Loess more than 5 ft. thick on weathered Illinoian till	Forest	Light			Clinton	Clinton
		Loess 20 to 40 in. thick on weathered Illinoian till				Fishhook		
		Loess 0 to 20 in. thick on weathered Illinoian till				Atlas	Ursa	
		Loess 0 to 20 in. thick on slightly weathered Illinoian till					Hickory	Hickory
26EF	15–30%	Loess more than 5 ft. thick on weathered Illinoian till	Forest	Light			Clinton	Clinton
		Loess 0 to 20 in. thick on slightly weathered Illinoian till					Hickory	Hickory
		Loess 0 to 15 in. thick on shale					Gosport	
		Calcareous Illinoian till						Hennepin
26EG	15–30+%	Loess more than 5 ft. thick on weathered Illinoian till	Forest	Light			Clinton	Clinton
		Loess 0 to 20 in. thick on slightly weathered Illinoian till					Hickory	Hickory
		Loess 0 to 15 in. thick on shale					Gosport	
		Calcareous Illinoian till						Hennepin
40B	2–5%	Loess 40 to 60 in. thick on medium-textured outwash	Prairie-forest Forest	Mod. dark Light		Virgil Kendall	Batavia St. Charles	Batavia St. Charles
40C	5–10%	Loess 40 to 60 in. thick on medium-textured outwash	Prairie-forest Forest	Mod. dark Light			Batavia St. Charles	Batavia St. Charles
		Loess 20 to 40 in. thick on medium-textured outwash					Camden	Camden
40CD	5–15%	Loess 40 to 60 in. thick on medium-textured outwash	Forest	Light			St. Charles	St. Charles
		Loess 20 to 40 in. thick on medium-textured outwash					Camden	Camden

[a] Assumption soils occur on slopes where the loess is 20 to 40 in. thick.

Table 1 (continued).

Soil association	Dominant slope	Parent material	Native vegetation	Surface color	Natural drainage class			
					Poor	Somewhat poor	Moderately well	Well
43B	2–5%	Silty colluvial sediments more than 5 ft. thick on medium-textured outwash	Prairie	Dark (more than 24 in.)		Littleton	Worthen	Worthen
				Dark (10 to 24 in.)		Coffeen	Raddle	Raddle
69A	0–2%	Silty alluvium more than 45 in. thick on stratified, medium-textured material	Prairie-forest	Dark	Otter	Lawson	Huntsville	Huntsville
		Silty alluvium 20 to 40 in. thick on dark, moderately heavy-textured alluvium				Radford		
		Moderately heavy alluvium more than 40 in. thick on stratified, medium-textured material			Sawmill			
		Silty alluvium 20 to 40 in. thick over dark, medium-textured material		Light		Orion		

Climate

Climate controls not only the moisture and temperature conditions under which the soils developed but also the type of native vegetation that grew on the soils during their formation. Over past geologic time, shifts in climate have occurred many times, but it is generally considered that the climate in Knox County since the last glaciation has been rather similar to that of the present, except for a warmer and drier period some 4,000 to 6,000 years ago. The current mean annual temperature is about 51° F., with cold winters and hot summers; the growing season is about 175 days; average annual precipitation is about 34 inches. Under these climatic conditions, the soils of Knox County have been leached of some nutrients, clay has formed and accumulated in the subsoils, organic matter has accumulated, and the present soil profiles have developed. Most soils in Knox County are only moderately developed and are not extremely acid or leached. However, liming and fertilization according to needs indicated by soil tests are essential to good crop production.

Native Vegetation

Prairie and forest are the two major types of vegetation that influenced the soils of Knox County. Soils formed under prairie grasses have thick, dark-colored surfaces; those formed under forest have thin, dark or moderately dark surfaces. The dark surface soil on the forest soils is generally less than 4 or 5 inches thick; when plowed and mixed with the light-colored, underlying subsurface soil, the plow layer is generally considered to be light colored. Some soils in areas where forest had encroached on or spread into prairie areas have moderately dark surface soil and are intermediate in many properties between prairie and forest soils. These are often referred to as prairie-to-forest transition soils, or soils of the prairie-forest border.

At the time of its early settlement, about 57 percent of Knox County was in prairie, mainly on the broad, nearly level upland divides between streams, and about 33 percent was in forest on the better drained, more sloping areas near stream valleys. Prairies are believed to have been more widespread during that warm, dry period some 4,000 to 6,000 years ago; the Knox County prairies, therefore, may be a remnant of a warmer and drier climate. At the time of settlement, however, it is probable that the forests were spreading into the prairie areas, since the present climate of the area favors this trend in vegetative succession.

The native vegetation on the bottomland areas in Knox County (about 10 percent of the county) was probably largely forest, although in the larger valleys, such as the Spoon River valley, a mixture of trees and grasses was present in many places. The surface soil color of the bottomland soils is related more to the color of the sediments deposited by floods than to the native vegetation. Most bottomland soils in the county are dark colored.

Topography and Drainage

Topography and drainage control in large part the degree to which soils are saturated with water under a given climate. The slope of a soil influences the amount of runoff or runon and thus the amount of water that infiltrates and passes through a soil. Sloping areas tend to have more runoff and thus are subject to erosion, whereas level or depressional areas may have water from higher lying soils ponded on them. Depressional areas usually receive sediments eroded from higher parts of the landscape. In medium-textured materials such as loess, there is usually a close relationship between slope

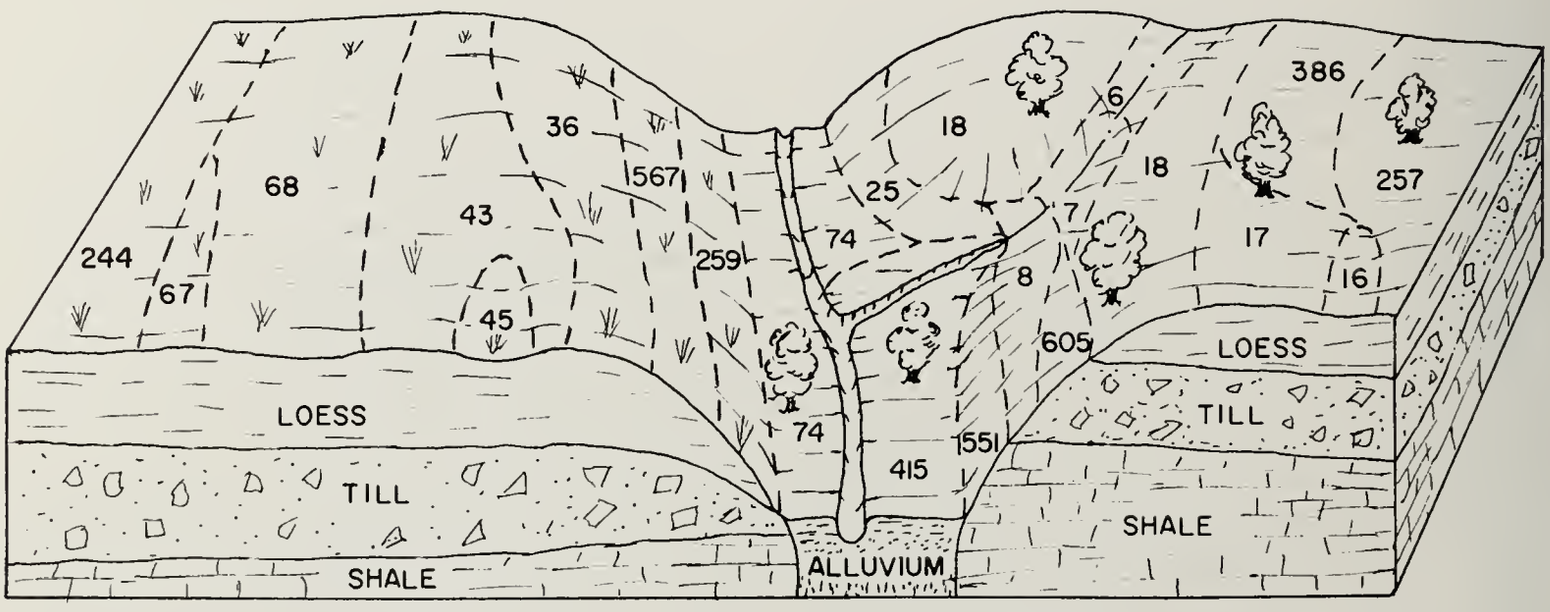
and natural soil drainage. Thus, strongly sloping soils tend to be well drained, and flat or depressional soils are usually poorly drained. This relationship holds reasonably well for the soils in Knox County. Well-drained soils have rather uniform brown or yellowish-brown colors in their subsoils. Poorly drained soils tend to be gray, and somewhat poorly drained soils usually have mottled gray and brown colors in their subsoils.

Time

The number of years over which soils form is not always a good measure of the influence of time on soil development. As mentioned under the discussion of parent materials, the loess soils of Knox County have been formed predominantly in the last 11,000 to 12,000 years, yet they are only moderately developed. Such things as a high lime content of the original loess parent material, for example, have tended to slow soil development. On steep slopes, soils formed in very old glacial till or bedrock are not strongly developed if geologic erosion has occurred at a rate that removes the soils nearly as fast as soil development takes place; this is the case on many steep slopes in Knox County. On some of the more gentle slopes in the county, usually not far from the heads of drainageways, highly developed soils (formed during the long Sangamonian interglacial period between the Illinoian and Wisconsinan glacial stages) have been exposed by erosion and drainageways cutting back into the more level tablelands. In general, these exposed soils are some of the most strongly developed ones in the county.

The bottomland soils show the least soil profile development in Knox County. The sediments from which these soils developed have accumulated gradually over the last several thousand years, and new sediment is still being added in most bottomland areas.

The occurrence of various soils in relation to slope and landscape position is depicted in Figure 1 for the upland soil associations and in Figure 2 for the terrace and bottomland soil associations. In each drawing, the soil association numbers — 3A, 40B, etc. — are listed below the diagram and the various soils in each association are named. The numbers preceding the soil names, such as 243 for St. Charles, etc., are numbers used statewide on soil maps for identifying each individual soil.



3A	3B	3C	26A	26AB
43 Ipava, 0-2%	43 Ipava, 2-3%	36 Tama, 5-10%	17 Keomah, 0-2%	17 Keomah, 0-2%
68 Sable, 0-1%	36 Tama, 2-5%	567 Elkhart, 7-10%	16 Rushville, 0-1%	18 Clinton, 2-5%
244 Hartsburg, 0-1%	68 Sable, 0-1%	386 Downs, 5-10%	257 Clarksdale, 0-2%	257 Clarksdale, 0-3%
45 Denny, 0-1%	45 Denny, 0-1%	259 Assumption, 7-10%		386 Downs, 2-5%
67 Harpster, 0-1%				16 Rushville, 0-1%

26CD	26EF	26EG	69A
18 Clinton, 5-15%	18 Clinton, 15-30%	8 Hickory, 20-30+%	74 Radford, 0-2%
8 Hickory, 10-15%	8 Hickory, 15-30%	551 Gosport, 25-30+%	415 Orion, 0-2%
7 Atlas, 7-15%	551 Gosport, 20-30%	18 Clinton, 15-30+%	
605 Ursa, 7-15%	25 Hennepin, 20-30%	25 Hennepin, 25-30+%	
6 Fishhook, 5-10%			

Landscapes of soils in upland soil associations 3A, 3B, 3C, 26A, 26AB, 26CD, 26EF, and 26EG and part of bottomland soil association 69A in Knox County, Illinois. **(Figure 1)**

3A. Ipava-Sable Association, 0 to 2 percent slopes

These soils are on the broad, nearly level drainage divides between streams. Slopes range from 0 to 2 percent. On the main divides between major streams, this association occurs as large, continuous, irregularly shaped bodies that vary in width from a few hundred feet to about two miles. The broad areas thin into smaller, finger-like bodies along the secondary divides between the smaller tributary streams. The pattern changes somewhat in the Abington area in southwestern Knox County, where the drainage divides are more rounded and soils of the Ipava-Tama soil association dominate. There, soils of the Ipava-Sable association commonly form small, isolated bodies in concave areas at somewhat lower elevations than the surrounding Ipava-Tama soils.

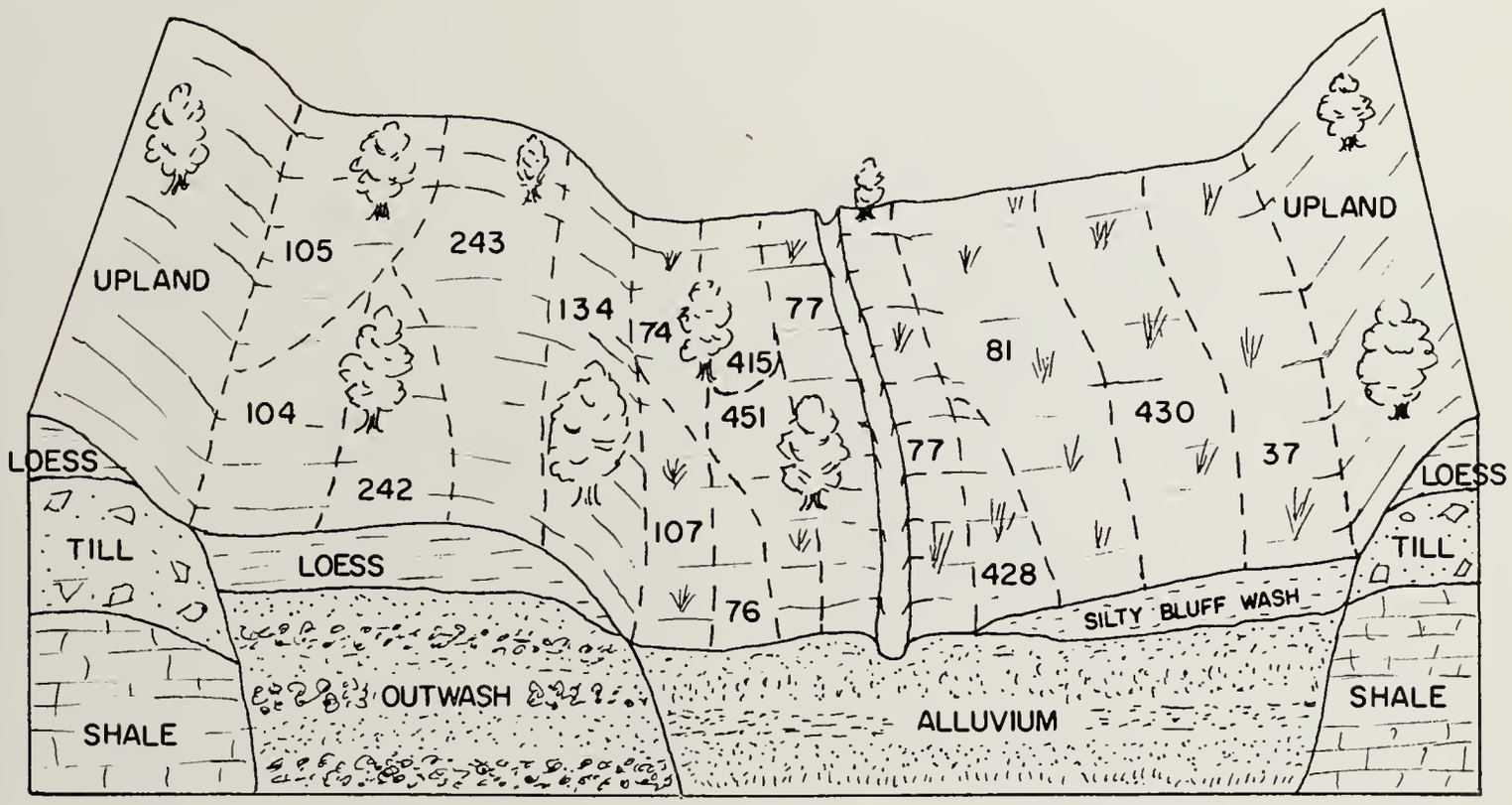
Ipava-Sable soils are distributed throughout the county but are most extensive in the Galesburg area. They form about 19 percent of the total land surface in Knox County.

This association consists of dark-colored soils that have developed in silty (loess) parent material under tall prairie grasses. The natural drainage ranges from somewhat poor to poor. Almost all of these soils have been tile drained.

Ipava soils are on 0 to 2 percent slopes and constitute about 50 percent of the association. They are predominantly on the narrower divides, near the edges of the broad divides, and on very slightly rounded areas distributed throughout the association. They are somewhat poorly drained.

Ipava soils have a black or very dark gray silt loam surface layer that is about 15 inches thick. The subsoil is grayish-brown heavy silty clay loam or light silty clay and has yellowish-brown mottles. It is about 35 inches thick. The underlying material is gray silt loam with yellowish-brown mottles.

Ipava soils have moderate permeability and very high available water capacity. Drainage tile work well in these soils, most of which need tile for maximum productivity.



40B
243 St. Charles, 2-5%
105 Batavia, 2-5%
104 Virgil, 1-3%
242 Kendall, 1-3%

40C
243 St. Charles, 5-10%
134 Camden, 7-10%
105 Batavia, 5-10%

40CD
134 Camden, 10-15%
243 St. Charles, 7-15%

69A
451 Lawson, 0-1%
77 Huntsville, 1-2%
415 Orion, 0-2%
74 Radford, 0-2%
107 Sawmill, 0-1%
76 Otter, 0-1%

43B
37 Worthen, 2-5%
81 Littleton, 1-3%
430 Raddle, 2-5%
428 Coffeen, 1-3%

Landscapes of soils in terrace soil associations 40B, 40C, 40CD, and 43B and bottomland soil association 69A in Knox County, Illinois. (Figure 2)

Ipava soils are high in organic matter and natural fertility. They are well suited for corn and soybean production and for production of other crops common to the area. They can be row-cropped continuously without serious erosion problems, especially if conservation tillage is practiced.

Sable soils are on 0 to 1 percent slopes and make up about 45 percent of this association. They occur most commonly on the flat to slightly concave areas of the broader drainage divides. They are poorly drained.

Sable soils have a black silty clay loam surface soil about 20 inches thick. The subsoil is about 25 inches thick and is light brownish-gray silty clay loam. The underlying material is gray silt loam.

Sable soils have moderate permeability and very high available water capacity. Drainage tile work well in these soils and are needed to allow intensive row cropping. Sable soils are high in organic matter and natural fertility. They are well suited for corn and soybean production and for production of other crops common to the area. They can be row-cropped continuously without serious erosion problems.

Minor soils in this association are Hartsburg, Denny, Harpster, and others. Hartsburg soils make up about 3 percent of the association and are most extensive in the west-central part of the county. They occupy flat areas or large, shallow depressions. They are similar to Sable soils in many ways but are high in lime content at a shallower depth (between 15 and 35 inches) than Sable. Denny soils form about 1 percent of the association and occupy small, shallow depressions. They can be seen as "gray spots" when the soil surface is freshly tilled and somewhat dry. The surface of Denny is about 9 inches thick and is very dark grayish-brown silt loam. The subsurface horizon is about 8 inches thick and is a grayish-brown silt loam. The subsoil, about 40 inches thick, is mixed gray, light brownish gray, and yellowish brown; it is silty clay in the upper part and silty clay loam in the lower part. Denny soils are poorly drained, have slow permeability, and have moderate organic matter content and natural fertility. They are well suited for row crop production where artificially drained. Harpster soils, which form about 1 percent of the association, occupy nearly level areas. They have a black silty clay loam surface layer that is about 16 inches thick. They are calcareous (high in lime) and contain many snail-shell fragments. The subsoil, about 19 inches thick, is mottled dark gray and gray silty clay loam. It, too, is calcareous and has shell fragments. The underlying material is mottled gray silt loam. Harpster soils are poorly drained, have moderate permeability, and are high in organic matter and natural fertility. They are well suited for row crop production where artificially drained. Iron deficiency is sometimes a problem in soybeans on these soils because iron is less available to plants where soils are calcareous.

Intensive corn and soybean production is the predominant land use in the Ipava-Sable soil association, and the soils are very well suited for that use. Wetness is the most important limitation to crop production, but excess water can be satisfactorily removed by tile drainage. In general, these are excellent soils for corn and soybean production.

3B. Ipava-Tama Association, 2 to 5 percent slopes

These soils are on gently sloping areas of the uplands; slopes range from 2 to 5 percent. They are concentrated along the drainage divides between streams and major upland drainageways. They most commonly occur on shoulder slopes, upper sideslopes, and narrow ridge tops around the edges of extensive upland flats, which are primarily Ipava-Sable soils. They also occupy small isolated hills on the upland flats in some places. In the Abingdon area of southwestern Knox County there are no extensive flats along the major divide; there is, instead, an extensive area of gently undulating soils that are predominantly Ipava-Tama soils, with only small areas of Ipava-Sable soils in concave areas at a slightly lower elevation.

The Ipava-Tama soil association occupies about 22 percent of the total land surface in Knox County. It consists of dark-colored soils that have developed in silty (loess) parent material under tall prairie grasses. Natural drainage ranges from well to somewhat poor. Much of the somewhat poorly drained soil in this association has been tile drained.

Ipava soils, which are on 2 to 3 percent slopes, make up about 54 percent of the association. Ipava is somewhat less extensive and Tama more extensive in the southeastern and northeastern parts of the county.

Ipava soils are predominantly on moderately wide ridge tops and near the edge of broad upland ridges. They are most commonly, but not always, upslope from the Tama soils. They are somewhat poorly drained.

Ipava soils have a black or very dark gray silt loam surface layer about 15 inches thick. The subsoil is grayish-brown silty clay loam or light silty clay and has yellowish-brown mottles. It is about 35 inches thick. The underlying material is gray silt loam with yellowish-brown mottles.

Ipava soils have moderate permeability and very high available water capacity. Drainage tile work well in these soils, most of which need tile for maximum productivity. Ipava soils are high in organic matter and natural fertility. They are well suited for corn and soybean production and for production of other crops common to the area. They can be row-cropped continuously without serious erosion problems, especially if conservation tillage is practiced.

Tama soils are on 2 to 5 percent slopes and make up about 40 percent of the association. Tama is somewhat more extensive and Ipava less extensive in the southeastern and northeastern parts of the county. Tama soils occur predominantly on sideslopes and narrow ridge tops

or other areas where the surface is gently sloping or rounded. They are moderately well and well drained.

Tama soils have a very dark brown silt loam surface layer about 13 inches thick. The subsoil is silty clay loam and is about 50 inches thick. It is dark brown in the upper part, yellowish brown in the middle part, and mottled yellowish brown in the lower part. The underlying material is mottled yellowish-brown silt loam.

Tama soils have moderate permeability and very high available water capacity. They are high in organic matter and natural fertility. They are well suited for corn and soybean production and for production of other crops common to the area. Erosion hazard is the principal factor limiting cropping intensity, and erosion control practices such as terracing or conservation tillage should be used.

Minor soils in this association are Sable, Denny, and others. Sable soils make up about 5 percent of the association. These soils are primarily in low areas in the upper reaches of upland drainageways. They have a black silty clay loam surface soil about 20 inches thick. The subsoil consists of about 25 inches of light brownish-gray silty clay loam; the underlying material is gray silt loam. Sable soils are poorly drained and have moderate permeability. Wetness, the most important management hazard, can be corrected by tile drainage. Sable soils are excellent soils for intensive crop production. Denny soils form about 1 percent of the association and occupy small, shallow depressions. They can be seen as "gray spots" when the soil surface is freshly tilled and somewhat dry. The surface soil is very dark grayish-brown silt loam about 9 inches thick. The grayish-brown silt loam subsurface horizon is about 8 inches thick. The subsoil, about 40 inches thick, is mixed gray, light brownish gray, and yellowish brown; it is silty clay in the upper part and silty clay loam in the lower part. Denny soils are poorly drained, have slow permeability, and are moderate in organic matter and natural fertility. They are well suited for row crop production where artificially drained.

Intensive corn and soybean production is the predominant land use in the Ipava-Tama soil association. These soils are very well suited for intensive cropping if properly managed. Erosion is the most important hazard affecting use and management. Erosion control practices such as terracing or conservation tillage should be used to control erosion where needed. In general, these are excellent soils for row crop production.

3C. Tama-Elkhart-Downs Association, 5 to 10 percent slopes

These soils are on sloping areas of the uplands, with slopes ranging from 5 to 10 percent. They commonly are on sideslopes along upland drainageways.

Tama-Elkhart-Downs soils are distributed throughout the county but are most extensive in the northeast part. They form about 7 percent of the total land surface in Knox County. This association consists of dark soils formed under grass and moderately dark soils formed under grass and trees in silty (loess) parent material. They are moderately well and well drained.

Tama soils, which formed under grass, make up about 65 percent of the association. They are moderately well and well drained. The Tama soils in this association have been moderately or severely eroded; as a result, the original very dark brown silt loam surface layer is commonly less than 12 inches thick, has been lightened in color by mixing with subsoil material, or is entirely absent so that the present plow layer is entirely within the subsoil. The subsoil is silty clay loam and about 36 inches thick; it is dark brown in the upper part and yellowish brown in the lower part. The underlying material is mottled yellowish-brown silt loam.

Tama soils have moderate permeability and very high available water capacity. They range from high to low in organic matter and natural fertility, depending upon the severity of erosion damage. They are well suited for corn and soybean production and for production of other crops common to the area. These soils should not be used for continuous row cropping because of the erosion hazard. Erosion control practices such as terracing or conservation tillage should be used.

Elkhart soils have formed under grass and make up about 15 percent of the association. They occur most commonly on convex shoulder slopes and upper sideslopes. They are well drained.

The Elkhart soils in this association have commonly been moderately or severely eroded. Thus, the original very dark grayish-brown surface layer is often less than 10 inches thick, has been lightened in color by mixing with subsoil material, or is entirely absent so that the present plow layer is entirely within the subsoil. The subsoil is silty clay loam about 20 inches thick. It grades in color from dark brown in the uppermost part to yellowish brown in the lower part. The underlying material is mottled yellowish-brown silt loam. Elkhart soils have a high lime content at shallower depths than Tama soils.

Elkhart soils have moderate permeability and high available water capacity. They range from high to low in organic matter and natural fertility, depending upon the severity of erosion damage. They are well suited for corn and soybean production and for production of other crops common to the area. These soils should not be used for continuous row cropping because of the erosion hazard. Erosion control practices such as terracing and conservation tillage should be used.

Downs soils have formed under grass and trees and make up about 15 percent of the association. They are moderately well and well drained.

The Downs soils in this association have commonly been moderately or severely eroded. The silt loam surface layer is about 8 inches thick and ranges from very dark gray to brown in color, depending upon the amount of subsoil mixed into the plow layer because of erosion damage. The subsoil is silty clay loam about 40 inches thick; it is brown to dark yellowish brown in the upper

part and yellowish brown in the lower part. The underlying material is yellowish-brown silt loam.

Downs soils have moderate permeability and very high available water capacities. They range from moderate to low in organic matter and natural fertility, depending upon the severity of erosion damage. They are well suited for corn and soybean production and for other crops common to the area. These soils should not be used for continuous row cropping, however, because of the erosion hazard. Erosion control practices such as terracing and conservation tillage should be used.

Minor soils in this association are the Assumption soils, which have developed under grass and make up about 5 percent of the association. They occur primarily in coves and on convex shoulder slopes of 7 to 10 percent grade. Assumption soils have commonly been moderately to severely eroded. The surface layer is very dark grayish brown to dark grayish brown, depending upon the severity of the erosion damage, and is about 8 inches thick. The subsoil, which is 4 to 7 feet thick, is dark yellowish-brown silty clay loam in the upper part and gray clay loam in the lower part. Assumption soils are well or moderately well drained and have moderate to moderately slow permeability. Seepy areas are common on sideslopes, where water comes out to the surface because of restricted permeability in the subsoil. These soils are more erosive than surrounding soils on the landscape, and erosion damage is more serious on these soils than on many other soils because of the unfavorable subsoil. Where they have not been seriously damaged by erosion, Assumption soils are suitable for periodic row crop production. Terracing and conservation tillage should be practiced, and row crops should be rotated with small grains and pasture or hayland.

The Tama-Elkhart-Downs soil association is most commonly used for rotation cropping. Erosion is the most important hazard affecting use and management. Close-growing crops should be included in the rotation, and terracing or conservation tillage should be practiced. In general, these are good soils for crop production if used carefully.

26A. Keomah-Rushville-Clarksdale Association, 0 to 2 percent slopes

This association occupies only about 0.3 percent of Knox County. The soils occupy small, nearly level, upland areas and occur mainly south of Galesburg in the Lake Bracken area and in the east-central part of the county. The association occurs on the more level portions of the broader ridgetops that were originally forested. The soils are light colored or moderately dark and developed in loess deposits more than 5 feet thick. Natural drainage of the soils in this association ranges from poorly to somewhat poorly drained, with the somewhat poorly drained soils dominating.

Keomah soils occupy about 50 percent of the association, are nearly level, and are somewhat poorly drained. The surface layer is occasionally very dark gray but more commonly dark gray silt loam 5 to 10 inches thick overlying a grayish-brown silt loam subsurface layer. The subsurface layer varies from about 2 to 5 inches thick. The subsoil is dark yellowish-brown silty clay loam or silty clay mottled with gray and ranges in thickness from about 2½ to 4 or 5 feet. The underlying material is mixed gray and strong brown loess of silt loam texture; it may be leached or may contain carbonates. Permeability is moderately slow, and drainage improvement will increase yield in some years. Open ditches or closely spaced tile lines will provide drainage. Shallow surface ditches or surface inlets to tile may be needed to remove excess surface water in level or small, depressional areas. Erosion on Keomah is a minor problem because of its nearly level landscape position. Keomah soils have moderately high natural fertility and moderately low organic matter content. When properly managed, these soils are suited to the crops commonly grown in the area.

Rushville soils occupy about 25 percent of this association; they are nearly level to depressional and are poorly to very poorly drained. The surface layer is mainly dark grayish-brown to light brownish-gray silt loam 5 to 10 inches thick overlying a gray to light gray silt loam subsurface layer. The subsurface layer is usually 3 to 8 inches thick. The subsoil is mottled gray, grayish-brown, and brown silty clay loam to silty clay ranging in thickness from about 2½ to 4 or 5 feet. The underlying material is silt loam loess, mainly gray mottled with brown. In places, this underlying material may be calcareous. Rushville soils have slow to very slow permeability and are frequently saturated with water. Regular tile drainage is not recommended because of the slow permeability. Shallow surface ditches may be used to remove excess surface water. For some depressional areas, single tile lines with surface inlets may be beneficial. Erosion is not a problem on Rushville soils because of their level to depressional landscape position. Rushville soils have moderate natural fertility and are low in organic matter and nitrogen. When drainage is adequate, these soils are adapted to the crops commonly grown in the area; wet, difficult to drain areas are frequently used for pasture.

Clarksdale soils are similar to Keomah soils but have darker colored surface horizons. They make up the remaining 25 percent of this association. They are somewhat poorly drained and usually occur on nearly level landscape positions. The surface layer is very dark gray silt loam 6 to 10 inches thick. The subsurface layer, averaging about 3 to 6 inches thick, is normally dark gray silt loam. The upper subsoil is brown with grayish-brown mottles, and the lower subsoil is grayish brown. The subsoil texture is silty clay loam to light silty clay and ranges in thickness from about 2½ to 4 feet. The underlying material is gray or olive-gray silt loam loess, frequently containing carbonates at less than 5 feet. Because permeability is moderately slow, drainage is usually needed for maximum crop production. Closely spaced tile lines will normally provide adequate drainage; a few areas may need shallow surface ditches or surface tile inlets to re-

move excess surface water. Like the other soils in this association, Clarksdale soils are not subject to serious erosion. These soils have moderately high natural fertility and organic matter content. They are well suited to the commonly grown crops of the area when drainage is adequate.

Soils of the Keomah-Rushville-Clarksdale association are intensively cropped to corn and soybeans. Small grain and hay crops are occasionally grown. Providing adequate drainage is a major problem. When drainage and fertility are provided under good management, the soils of this association are moderately to highly productive.

26AB. Keomah-Clinton-Clarksdale Association, 0 to 5 percent slopes

This association occupies about 12 percent of the county. It occurs on the nearly level to gently sloping ridgetops or drainage divides in the dissected portions of the county associated with the major streams and their tributaries. Many of these ridgetops are narrow and elongated with the more sloping areas occurring nearest the edges and points of the fingered landscape pattern. Occurrence is widespread throughout the county. The soils of this association are light or moderately dark, having formed under forest or mixed forest-grass vegetation. Natural drainage ranges from poorly to well but is mainly somewhat poorly to moderately well. Somewhat poorly drained soils make up more than 50 percent of the association. A few small, poorly drained areas are present in places. The soils of this association developed in loess deposits more than 5 feet thick. This association is similar to soil association 26A but has more gently sloping topography, narrower ridgetops, and a smaller percentage of poorly drained soils.

Keomah soils occupy about 35 percent of the association. They are somewhat poorly drained and occur mainly in the nearly level portions of the association. The surface soil is dark gray silt loam about 5 to 10 inches thick. The subsurface layer averages 2 to 5 inches thick and is grayish-brown silt loam. The subsoil is dark yellowish brown mottled with gray and has silty clay loam or silty clay texture. The subsoil ranges from 2½ feet to as much as 4 or 5 feet thick. The underlying material is mixed gray and strong brown silt loam loess, which may contain carbonates. Permeability is moderately slow. Improving drainage on Keomah soils is usually beneficial. Closely spaced tile lines will usually provide drainage, and some areas may benefit from shallow surface ditches or surface inlets to tile to remove excess surface water. Erosion is generally not a problem but may occur on some of the more sloping areas. Keomah soils have moderately high natural fertility and moderately low organic matter content. When properly managed, these soils are suited to the commonly grown crops of the area.

Clinton soils are moderately well and well drained and occur on the more sloping portions of the association, mainly the convex or more narrow ridgetops. They occupy about 35 percent of the association. Clinton soils have dark grayish-brown silt loam surface layers about 5 to 10 inches thick overlying a brown to dark grayish-brown subsurface layer that is about 3 to 9 inches thick. The subsoil is dark yellowish-brown and brown silty clay loam or silty clay and has grayish-brown and strong brown mottles in the lower part; it ranges from about 2½ to 4 feet thick. The underlying material, which is yellowish-brown silt loam loess with gray and brown mottles, may contain carbonates. Permeability is moderately slow, but drainage is adequate for general cropping. Chances for erosion are greater on Clinton than on the other soils of the association, but most areas are uneroded or only slightly eroded. These soils have moderately high natural fertility and moderately low organic matter content. Because of the gently sloping positions of Clinton soils in this association, they are well adapted to cultivated crops such as corn and soybeans and to the other crops commonly grown in the area.

Clarksdale soils occupy about 20 percent of this association. They have darker surface horizons than Keomah and Clinton soils and border the darker colored soils developed under grass vegetation. Clarksdale soils occur mainly in the nearly level areas of the broader portions of the association and are somewhat poorly drained. The surface soil is very dark gray silt loam about 6 to 10 inches thick overlying a dark gray silt loam subsurface horizon that averages from 3 to 6 inches thick. The subsoil is silty clay loam to light silty clay and averages from 2½ to 4 feet thick. The upper subsoil is brown with grayish-brown mottles; the lower subsoil is grayish brown. The underlying material is olive-gray or gray silt loam loess and may contain carbonates. Permeability is moderately slow, and artificial drainage is usually needed for maximum production. Adequate drainage can be provided by closely spaced tile lines. A few areas may need shallow surface ditches or surface tile inlets to remove excess surface water. Erosion is seldom a problem on Clarksdale soils. They have moderately high natural fertility and organic matter content. When drainage is provided as needed, these soils are well suited to the commonly grown crops of the area.

Minor soils in this association are Downs, Rushville, and others; they make up about 10 percent of the association. Downs soils are well and moderately well drained and occur on gently sloping ridgetops bordering areas of prairie soils. They are similar to the Clinton soils but have darker colored surface horizons and subsoils no finer than silty clay loam textures. They have very dark gray silt loam surface horizons, dark yellowish-brown and yellowish-brown silty clay loam subsoil horizons, and mottled brown and gray silt loam underlying material. Downs soils are somewhat more productive than Clinton soils. Rushville soils are similar to Keomah soils but are poorly drained and usually occupy small, level to depressional areas. They have dark grayish-brown to light brownish-gray silt loam surface layers, mottled gray and brown silty clay and silty clay loam subsoil horizons, and mottled

gray and brown silt loam underlying material. Normal tiling is not recommended, and surface water is usually removed by shallow surface ditches or surface inlets into single tile lines. Rushville soils are less productive than Keomah soils.

Soils of the Keomah-Clinton-Clarksdale association are used for intensively cultivated crops such as corn and soybeans, but small grains and hay or pasture are also grown. Providing adequate drainage for Keomah, Clarksdale, and Rushville soils is the major management problem. Erosion is a concern on only a few of the more sloping portions of the association, mainly in areas of Clinton soils. Fertilizers are required for maximum sustained production, especially nitrogen for corn production. The productivity of these soils ranges from moderate to high.

26CD. Clinton-Hickory Association, 5 to 15 percent slopes

This soil association occurs mainly on the sloping and strongly sloping upper portions of drainageways in the areas of the county dissected by streams. These soils, which were originally forested, occupy approximately 13 percent of Knox County. The soils of the association are light colored and mainly well and moderately well drained; a few small, more poorly drained areas occur on slopes where seepage may occur. Clinton soils formed in loess greater than 5 feet thick, and Hickory soils formed in loam and clay loam glacial drift. All cultivated areas are subject to erosion, which is generally moderate to severe.

Clinton soils are estimated to make up about 50 percent of the association. They are moderately well and well drained. In some areas Clinton soils will occupy the entire slopes, but in many of the more strongly sloping areas Clinton soils will occupy the upper portion of the slope or occasionally the footslope, where the loess cover is thickest. Clinton soils in this association are similar to those in soil association 26AB but tend to have thinner surface and subsoil horizons because of erosion and their occurrence on steeper slopes. They have dark grayish-brown, brown, or dark yellowish-brown silt loam or silty clay loam surface layers, depending upon the amount of erosion. The subsoil is dark yellowish-brown or brown silty clay loam or silty clay and has grayish-brown and strong brown mottles in the lower part; it averages about 2½ to 4 feet thick. The underlying material is yellowish-brown silt loam loess, mottled with gray and brown. Permeability is moderately slow, but natural drainage is usually adequate. These soils have moderately high natural fertility and moderately low to very low organic matter content, depending upon the degree of erosion. Crops commonly grown in the area are adapted to these soils, but, in general, continuous row cropping should not be practiced on these soils because of the erosion hazard. Appropriate erosion control measures should be used on cropped areas.

Hickory soils occupy about 25 percent of this association. These well-drained and moderately well-drained soils occur mainly on the middle or lower parts of the upland valley sides bordering the flood plains of the streams. The surface layer, about 10 to 12 inches thick, is dark grayish-brown or brown loam or light clay loam. The lighter colors and clay loam textures occur in the most severely eroded areas. The subsoil is yellowish-brown clay loam, usually with gray and brown mottling in the lower part. The underlying material is brown clay loam or loam with brownish-gray and yellowish-brown mottles and often contains carbonates. Permeability is moderate on Hickory soils. Natural fertility is moderate, and organic matter content is moderately low or low, depending upon the degree of erosion. Moderate and severe erosion is common on Hickory soils, and erosion is a major problem on cultivated areas. Hay and row crops are grown in many areas, but pasture and woodland are better adapted to these soils because of the erosion hazard. Cropped areas should be protected with appropriate erosion control measures.

Minor soils in this association are Atlas, Ursa, Fishhook, and others. They are developed in Illinoian till paleosols that, in places, have a thin cover of loess or erosional sediments. Occupying an estimated 25 percent of the association, they tend to occur in small areas, often as bands, on the convex portions of the steeper slopes. Atlas soils are somewhat poorly drained and have very slow permeability. They have dark grayish-brown and grayish-brown silt loam surface layers and mottled grayish-brown and gray subsurface horizons; textures are heavy silty clay loam to clay, and they extend to depths of usually 5 feet or more. Ursa soils are similar to Atlas soils but are generally moderately well drained and have moderately slow or slow permeability. They have dark grayish-brown and brown silt loam surface layers. Subsoil layers are clay loam or clay in texture and are yellowish brown or brown in the upper part and gray or olive gray with mottling in the lower part; they extend to depths of 4 to 6 feet or more. Fishhook soils are somewhat poorly drained, like the Atlas soils, but commonly have slow permeability and are formed in 20 to 40 inches of loess over weathered glacial till. Fishhook soils have dark grayish-brown to brown silt loam surface layers; the subsoil layers, which extend to a depth of 5 feet or more, are mottled brown, yellowish-brown, and brownish-gray heavy silty clay loam in the upper part, and mainly gray heavy clay loam or clay with yellowish-brown mottles in the lower part. These minor soils all have undesirable permeability, and side-hill seepage on the slopes is common. Erosion is a severe hazard.

Because slopes are generally less than 15 percent, much of this association has been cleared of original forest cover and has been or is now being cultivated. Most areas of this association are subject to erosion, and most areas under cultivation have been moderately to severely eroded. The use of contouring, stripcropping, terracing,

and conservation tillage will be helpful in many areas; some cultivated areas should be returned to permanent pasture, used for hayland, or reforested. Some of the more strongly sloping portions of the association are being used for hay or pasture, and some areas have been maintained in forest; these practices are a deterrent to the erosion hazard. The less sloping portions of this association, where the loess parent materials or Clinton soils dominate, can be productive cropland when erosion control measures are used. Organic matter and nitrogen supplies normally range from moderately low to low. Productivity for cultivated crops is generally moderate to moderately low. Well-managed hayland, pastures, and woodland are generally moderately productive.

26EF. Clinton-Hickory-Gosport Association, 15 to 30 percent slopes

The Clinton-Hickory-Gosport soil association occurs on moderately steep and steep upland slopes along all of the major streams in Knox County. These soils were originally forested, are light colored, and occupy approximately 8 percent of the county. As indicated by the name, this association is similar to soil associations 26CD and 26EG but differs mainly in the slope range covered and in the distribution of parent materials and major soils. Loess, glacial till, and shale bedrock are all important parent materials in this association. The soils are well and moderately well drained.

Clinton soils, which occupy about 35 percent of the association, are moderately well and well drained. They tend to occur on the least sloping portions of the association, often on upper slope positions, and are developed entirely in loess. These soils have dark grayish-brown, brown, or dark yellowish-brown silt loam or silty clay loam surface layers, depending upon the amount of erosion that has occurred. The subsoil is dark yellowish-brown or brown silty clay loam or silty clay with grayish-brown and strong brown mottles in the lower part. The subsoil averages about 2½ to 4 feet thick and tends to be thinnest on the steepest slopes. The underlying material is yellowish-brown silt loam loess mottled with gray and brown. Permeability is moderately slow. Many areas are moderately eroded, and cultivated and overgrazed areas are frequently severely eroded. Because erosion is a serious hazard, most areas are best suited to permanent pasture or woodland uses. Natural fertility is moderately high and organic matter content ranges from moderately low to very low, depending upon the severity of erosion.

Hickory soils make up about 30 percent of the association. They are well and moderately well drained and have developed from glacial till or thin loess over glacial till. They may occur on all portions of slopes but most commonly are on the steeper middle or lower portions. The surface layer of these soils is usually 10 to 12 inches of dark grayish-brown or brown loam or light clay loam, depending upon the amount of erosion that has occurred. The subsoil is yellowish-brown clay loam, usually with gray and brown mottling in the lower part. The underlying material is brown loam or clay loam with brownish-gray and yellowish-brown mottles. Carbonates often occur below depths of 3½ to 4 feet. Natural fertility is moderate; organic matter content is moderately low to very low, depending upon erosion. Permeability is rated as moderate. Erosion is a serious hazard and occurs in many areas. Most areas are best suited for pasture or woodland.

Gosport soils occupy about 30 percent of the association. They tend to be on the steepest slopes of the association and often occur downslope from Hickory soils. They are mainly moderately well drained and have developed from shale parent materials or from thin loess or till over shale. The surface layer of Gosport soils is very dark gray or dark grayish-brown silty clay loam or silt loam about 4 to 10 inches thick. The subsoil is yellowish-brown, brown, or light olive-brown silty clay or silty clay loam about 20 inches thick. The underlying bedrock is silty clay to clay acid shale. Thin layers of siltstone, sandstone, and other less clayey material may be present in the underlying material. Because of the high clay content of this soil and the platy structure of the shale, permeability is very slow. The unfavorable permeability and the steep slopes on which they occur make erosion a severe hazard and limit the uses for Gosport soils. These areas are best adapted to woodland and wildlife. Natural fertility is low and organic matter content is low to very low, depending upon erosion.

Minor soils — mainly Hennepin, but including others — make up about 5 percent of this association. Hennepin soils occur on steep slopes, are developed in glacial till, and have thin surface and subsoil layers. Hennepin soils have dark grayish-brown or brown loam surface layers, brown or yellowish-brown loam subsoil layers averaging 4 to 10 inches thick, and brown loam or clay loam underlying material that contains carbonates. Permeability ranges from moderately slow to slow. Protection against erosion is a major problem on Hennepin soils.

Soils of the Clinton-Hickory-Gosport association are used mainly for pasture or hayland. Pasture establishment and renovation are usually easier than in the 26EG association because of fewer very steep slopes. Some areas remain in native forest. Erosion control is a main management concern, and a good cover of continuous vegetation is needed to effectively control erosion. Most areas have been moderately eroded, and a few cultivated or overgrazed areas are severely eroded. Productivity is variable; it ranges from moderate to very low, depending upon the parent materials present and the degree of erosion.

26EG. Hickory-Gosport-Clinton Association, 15 percent to more than 30 percent slopes

This soil association occurs mainly in east-central and south-central Knox County on the most sloping upland areas that border the flood plains of the major streams.

Slopes range from moderately steep to very steep. Soils in this association occur mainly along Spoon River north of Maquon and along the lower portions of the tributaries of Spoon River, mainly Sugar, Court, Middle, Haw, and Brush Creeks. Less extensive areas occur along the lower portions of Henderson and South Henderson Creeks northwest of Galesburg. The association makes up about 3.4 percent of Knox County. These areas were forested, and the soils are light colored.

The soils in this association are the same as those in soil association 26EF but include steeper slopes; this results in a different distribution of parent materials, and major shale bedrock occurs commonly. Loess parent materials occur in about 20 percent of the area, mainly on the upper, less sloping portions of the landscape. The soils of the association are well and moderately well drained.

Hickory soils are the most extensive soils in the association and are estimated to occupy about 40 percent of it. They are developed from glacial till or very thin loess over glacial till and are well or moderately well drained. Hickory soils may occur on all portions of the slopes but are most commonly found on the middle or lower portions. The surface layer varies with erosion conditions and is usually dark grayish-brown or brown loam or light clay loam about 10 to 12 inches thick. The subsoil is yellowish-brown clay loam, usually with gray and brown mottling in the lower part. The underlying material is brown loam or clay loam mottled with brownish gray and yellowish brown and is frequently calcareous below about 4 feet. Organic matter content varies with erosion and ranges from moderately low to very low. Natural fertility is about moderate. Permeability is moderate. The major management problem is controlling erosion. This soil is best suited for pasture or woodland.

Gosport soils occupy approximately 35 percent of this association. They are mostly moderately well drained and are developed from acid shale parent materials or from very thin loess or glacial till over shale. These soils often occur downslope from Hickory and tend to dominate the steepest slopes. The surface layer of these soils is very dark gray or dark grayish-brown silty clay loam or silt loam; color, texture, and thickness vary with the degree of erosion. The subsoil is yellowish-brown, brown, or light olive-brown silty clay or silty clay loam about 20 inches thick. The underlying material is acid shale bedrock, varying in texture from silty clay to clay. Sandstone, siltstone, and other less clayey material may be present in thin layers. Permeability is very slow because of the high clay content of the soil and the platy structure frequently present in the underlying shale material. Erosion may occur rapidly and can become severe in unprotected areas. Natural fertility is low and organic matter content is moderately low to very low, varying with degree of erosion. Areas of these soils are best adapted to woodland and wildlife.

Clinton soils are estimated to occupy about 20 percent of this association. They are moderately well- and well-drained soils developed entirely in loess. They tend to occur on the upper portion of the slopes. Depending upon erosion, Clinton soils have dark grayish-brown, brown, or dark yellowish-brown silt loam or silty clay loam surface horizons. The subsoil is dark yellowish-brown or brown silty clay loam or silty clay with grayish-brown and strong brown mottles in the lower part. The subsoil averages 2½ to 4 feet thick and is thinnest on the steepest slopes. Underlying material is yellowish-brown silt loam loess mottled with gray and brown. Natural drainage ranges from well to moderately well, and permeability is moderately slow. Because erosion is a major hazard, permanent pasture or woodland is recommended for these soils. Organic matter content ranges from low to very low, varying with erosion, and natural fertility is moderately high.

Minor soils — mainly Hennepin, but including others — make up about 5 percent of this association. Hennepin soils occur on very steep slopes, are usually eroded, and have thin surface and subsoil layers developed in glacial till. These soils have dark grayish-brown loam subsoil layers about 4 to 10 inches thick and brown loam or clay loam underlying material that contains high amounts of lime carbonates. Protecting against erosion is a major management problem. Permeability ranges from moderately slow to slow, primarily because of the weak structure and compact characteristics of the underlying material.

Soils of the Hickory-Gosport-Clinton association are cultivated in minor amounts because of the high percentage of steep and very steep slopes. Many areas have been maintained in native forest, and cleared areas are used mainly for pasture or hayland. Openland or woodland wildlife are well adapted. Most of the association has moderate erosion, but severe erosion occurs in some cultivated or overgrazed areas. Protection against erosion is best furnished by dense, vigorous, permanent vegetation. Although natural drainage is well or moderately well, permeability is variable. The slow to very slow permeability of some of the soils is a limitation for many uses and results in seepage of ground water on some hillsides. Productivity is variable but is mostly low to very low, depending upon the parent material and the degree of erosion.

40B. St. Charles-Batavia Association, 2 to 5 percent slopes

The St. Charles-Batavia soil association occurs predominantly on gently sloping benches or stream terraces along the Spoon River and its major tributaries in Knox County. This association is not extensive; it covers only about 0.6 percent of the county, usually occurring in continuous areas of less than 200 acres. Most of the areas are at elevations of 20 to 40 feet above the flood plains, but some are on lower positions that occasionally flood. Soils in this association are deep and range from well

or moderately well drained to somewhat poorly drained. Light to moderately dark in color, they formed under the influence of forest or a mixture of forest and prairie vegetation. These soils have formed in 40 to 60 inches of loess over medium-textured stratified materials.

St. Charles soils make up about 45 percent of this association. They are well-drained to moderately well-drained soils that occur on the higher and more sloping benches or terraces. The surface layers are grayish-brown to dark grayish-brown silt loams, usually less than 10 inches thick. The subsoils, developed mostly in the silty materials, are dark brown to dark yellowish-brown silty clay loams and usually extend to depths of about 50 inches. Lower subsoils and substrata of these soils are brown to yellowish-brown silt loams, stratified with bands of loams and sandy loams. St. Charles soils that occur on slopes of 3 to 5 percent are subject to some erosion. When cultivated, contouring and terracing will minimize soil losses from such areas. The moderate permeability of these soils and their substrata preclude any need for artificial drainage. These soils are high to very high in available water capacity and moderate in organic matter and natural fertility. They show good response to fertility management and are well suited to crops commonly grown in the region.

Batavia soils, like St. Charles soils, are well to moderately well drained and occur on the more sloping and higher benches or stream terraces. These soils occupy about 35 percent of the association. They are moderately dark colored and reflect the influence of both prairie grass and deciduous forest vegetation. The surface layers, which are silt loams, are darker in color and somewhat thicker than those of St. Charles soils. The subsoils are silty clay loams and vary from dark yellowish brown in the upper parts to brown in the lower parts, reaching a depth of about 50 inches. The lower subsoils and underlying materials are silt loams that are usually stratified with bands of loams and sandy loams. Like St. Charles soils, Batavia soils are susceptible to erosion when on 3 to 5 percent slopes. Contouring and terracing will minimize soil losses when these areas are cultivated. These soils do not need artificial drainage. They are moderately permeable and have high to very high available water capacity. They are higher than St. Charles soils in organic matter content and natural fertility. These soils are well suited to crops commonly grown in the region and produce high yields under good management.

Minor soils in this association are Virgil and Kendall. Virgil soils make up about 15 percent of the association and Kendall the remaining 10 percent. These minor soils occupy the more level, low-lying areas and are somewhat poorly drained. The surface layers of Virgil soils are moderately dark colored, like Batavia soils, and have formed under both prairie and forest vegetation. Kendall soils have light-colored surface layers and, like St. Charles soils, have formed under forest vegetation. Both Virgil and Kendall soils are moderately permeable and have high to very high water-supplying capacities. Erosion is seldom a serious problem on these soils. Most areas of these soils require improved drainage, and tile can be used since the soils are moderately permeable and are usually near suitable outlets. Virgil and Kendall soils that are located near the upper flood plains areas occasionally flood if not adequately protected by levees. Virgil soils are high in organic matter and very high in natural fertility. They are the most productive soils in the association if drainage problems are corrected. Kendall soils are moderately high in organic matter and natural fertility. Both Kendall and Virgil soils are suited to grain crops grown in the region.

Soils of this association are currently being cultivated intensively. Corn and soybeans are the main crops, and yields are moderately high to high under good management. The main limitation on the use of these soils for agriculture is erosion susceptibility on the more sloping areas. Seasonally high water tables may be a minor problem on some small, somewhat poorly drained areas of Kendall and Virgil soils that tend to occur on lower positions on the landscape.

40C. St. Charles-Camden Association, 5 to 10 percent slopes

The St. Charles-Camden soil association is located on the higher and more sloping benches or stream terraces in Knox County. It is not extensive, making up only about 0.5 percent of the total area of the county. This association occurs in small areas, usually of less than 200 acres in size, along the Spoon River and some of its major tributaries. Most of the landscape of this association has developed natural waterways that provide adequate drainage, although soils near these waterways are often moderately to severely eroded. The soils in this association have developed mostly in loess underlain by glacial, colluvial, and alluvial silt loams and by loams stratified with sandy loams and loamy sands. The St. Charles and Camden soils are light colored and were developed under forest vegetation. The Batavia soils were developed under both forest and prairie vegetation and are moderately dark colored.

St. Charles soils are the dominant soils in this association. They make up about 45 percent of the area and occupy the higher lying positions on the landscape, where loess is between 40 and 60 inches thick. The surface layer is a light-colored, thin silt loam that is often moderately to severely eroded. The subsoil is a dark yellowish-brown, dark brown, or brown silty clay loam that extends to a depth of about 45 to 50 inches. The lower subsoil and substrata of these soils are friable loams and silt loams. St. Charles soils are moderately well and well drained and moderately permeable. They have high to very high available water capacities. They contain moderate to low amounts of organic matter and are moderate in fertility. Under cultivation, these soils require terracing or contouring to reduce runoff and resulting soil losses. Row crops should be rotated with standover

meadow crops in which residues are returned to the soil; this will provide both a protective cover and a source of soil organic matter.

Camden soils occupy about 40 percent of the association and occur on the steeper portions of the landscape where the loess cover is less than about 35 inches thick. The surfaces of these soils are moderately to severely eroded light-colored silt loams. The subsoils are yellowish-brown to brown silty clay loams. Lower subsoils of these soils are developed in coarser sediments at 25 to 35 inches deep and are usually brown and dark brown silty clay loams to clay loams. Substrata in these soils, like those of St. Charles, are commonly loamy and stratified with sandy materials. Camden soils are deep, moderately permeable, and moderately well to well drained; they have a high water-supplying capacity. Erosion is often serious if terracing and contouring methods and rotation of tilled crops with cover crops are not used. These soils are moderate in organic matter and fertility. They are productive when managed well.

The only minor soils in this association are the Batavia soils, which make up about 15 percent of the association. These soils developed in areas where both prairie and forest natural vegetation existed. They have moderately dark-colored silt loam surface horizons that are thicker than the surface horizons of St. Charles and Camden soils. They also contain more organic matter and are slightly better in natural fertility than St. Charles and Camden soils. Batavia soils require about the same management as the other associated soils.

The soils of this association are currently cropped intensively to corn, soybeans, and small grains. The major problem with using these soils for row crops is that soil losses are usually severe. Contouring and terracing and greater use of small grains and meadow crops with good residue management will reduce erosion losses and help maintain good tilth and organic matter content.

40CD. Camden-St. Charles Association, 5 to 15 percent slopes

The Camden-St. Charles soil association consists of light-colored soils located on steeper benches or stream terraces where loess thickness varies from about 25 to nearly 50 inches. This association is very minor in extent in Knox County, covering only about 0.1 percent of the total area. Like the St. Charles-Camden association, this association occurs mainly in small areas scattered along the major drainageways of the county. The underlying material of these soils is colluvial or glacial-fluvial silt loams and loams that are sometimes intermixed with sandier material. The soils are well to moderately well drained, moderately permeable, and moderately to severely eroded. They developed under deciduous forest vegetation.

Camden soils occur on the steeper parts of the landscape of this association, where the loess is less than about 35 inches thick. These soils occupy 50 percent of the association and often occur as small units near drainageways downslope from St. Charles soils. Camden soils have light-colored, moderately to severely eroded silt loam or silty clay loam surface layers. The upper subsoils are yellowish-brown to brown silty clay loams to clay loams. Substrata of these soils are composed of coarser material and are often stratified with sandy loams. Camden soils are deep, moderately permeable, and well to moderately well drained but have high water-supplying capacities. They are moderate to low in organic matter and natural fertility. Erosion is a serious hazard when these soils are cultivated. Contouring, terracing, and rotating meadow and hay crops with row crops will help reduce soil losses.

St. Charles soils make up the remaining 50 percent of this soil association. These soils are located on the more level areas, where the loess cover is greater than about 40 inches thick. The St. Charles soils in this association are very similar to those that occur in other associations except that here they are more intermixed with the steeper, more eroded, and shallower Camden soils. They have thin, light-colored silt loam or silty clay loam surface layers that are moderately to severely eroded. The subsoils are yellowish-brown to brown silty clay loams to clay loams. Substrata are brown and strong brown silt loams and loams stratified with coarser materials. These soils are well to moderately well drained, are moderately permeable, and have high water-supplying capacities. Like the Camden soils, St. Charles soils in this association are very susceptible to runoff and severe erosion unless terracing and contouring are used with a cropping system that includes rotation of meadow, hay, and pasture crops.

Soils in this association have been used to produce a variety of row and standover crops that are common to the region. The risk of severe soil losses is the main limitation in using these soils for agriculture. Moderate to severe soil erosion has occurred on many of these areas where conservation measures have not been used. These soils can be row-cropped if hay and pasture are included in the crop rotation and if conservation practices such as contouring and terracing are used to reduce the danger of further soil losses.

43B. Worthen-Littleton-Raddle Association, 2 to 5 percent slopes

This soil association occurs on gently sloping benches or stream terraces in the Spoon River valley and in a few of the larger creek valleys. The areas are commonly small (generally less than 160 acres) and usually lie near the base of the slopes from the upland into the valley. The stream terraces range in elevation from a few feet to as much as 20 to 30 feet above the flood plain. The lower lying portions are subject to some flooding. These soils are dark colored, having formed under grass vegetation, and range in natural drainage from somewhat poorly to well drained. They have formed in silty colluvial and alluvial sediments and occupy about 0.4 percent of Knox County.

Worthen soils occupy about 30 percent of this association. They are well and moderately well drained and usually occur on the higher lying or more sloping areas in the association. The surface soil is dark colored and more than 24 inches thick. It is a very dark brown or very dark grayish-brown silt loam. The subsoil is brown silt loam about 20 inches thick, and the underlying material is a dark yellowish-brown silt loam, usually extending to depths of more than 60 inches. The material deeper than 60 inches is commonly more sandy, but the overall water-holding capacity of this soil is high. Worthen soils have moderate permeability. Drainage is not needed, but some of the steeper slopes are subject to some erosion. Where slopes are favorable, contouring and terracing reduce soil losses. These soils are high in organic matter content and are well suited to the crops commonly grown in the region. They require some fertility treatments and are highly productive when managed well.

Littleton soils are somewhat poorly drained and occur on less sloping and generally lower lying positions than Worthen soils. They occupy about 25 percent of this association. The surface soil is a very dark brown to black silt loam ranging from 24 inches to about 30 inches thick. The subsoil is dark grayish-brown silt loam about 24 inches thick. The underlying material to about 60 inches deep is dark grayish-brown silt loam with light brownish-gray mottles. Below 50 to 60 inches the material commonly becomes somewhat sandier, but the soil profile in general has a high moisture storage capacity. Organic matter content is high and soil treatment needs are moderate to low. Erosion is seldom a serious hazard, but some of the lower lying portions of these soils may need improved drainage. Tiling is effective since permeability is moderate. Some of the lower lying portions of this soil, which are only slightly higher than the bottomland soils, are subject to flooding unless protected by levees. Littleton soils are well suited to grain crops commonly grown in the region and are highly productive.

Raddle soils are dark colored and well or moderately well drained. They occupy about 25 percent of this association and occur on higher lying positions in close association with the Worthen soils. The main difference between the two is that the Raddle soils have thinner (10 to 24 inches thick) dark-colored surface horizons and usually contain more sand at shallower depths than the Worthen soils. Fertility requirements, in general, are slightly greater on Raddle soils, but erosion control and other management requirements are similar to those of Worthen soils. Crop adaptation and use are also similar. However, Raddle soils are slightly less productive.

Minor soils in this association are Coffeen and others. Coffeen soils occupy about 20 percent of the area. They are nearly level and similar to Littleton soils but have thinner (10 to 24 inches thick) dark-colored surface soils. Use and management are similar on the Coffeen and Littleton soils, but Coffeen soils are slightly less productive.

Soils of the Worthen-Littleton-Raddle association are intensively cropped to corn and soybeans although some other grain crops and some alfalfa are grown. Erosion control on the more sloping areas and flooding on the low-lying areas are the main concerns of management. The soils are moderately permeable and, in general, highly productive.

69A. Lawson-Huntsville-Orion Association, 0 to 2 percent slopes

The Lawson-Huntsville-Orion soil association occurs on flood plains of streams throughout Knox County. Most areas are nearly level, but some are gently sloping, particularly where low ridges and swales have formed in places in the larger valleys, such as in the Spoon River valley, where the most extensive bottomlands are found. About 9 percent of the county is in this soil association.

These soils are subject to flooding unless protected by levees. Unprotected areas are sometimes flooded and wet late in the spring, thus delaying the planting of summer crops such as corn and soybeans. The soils of this association have formed in alluvium, and most are dark colored. They range in natural drainage from poorly to well drained. The better drained soils usually are near the stream channels. The poorly drained soils occur in swales and old, abandoned channels.

Lawson soils are deep, dark, somewhat poorly drained silty soils. They are the most extensive bottomland soils in Knox County and occupy about 40 percent of this association. They occur in many small stream bottomlands as well as in the Spoon River valley. The surface soil is a dark grayish-brown or black silt loam 24 to 36 inches thick. The subsoil, a dark gray or grayish-brown silt loam, is not very strongly developed because it has accumulated in recent geologic times. Sand content usually increases somewhat with depth in the underlying material. Lawson soils are moderately permeable and can be tile-drained where suitable tile outlets are available. The need for additional drainage is variable, usually being least in the small creek bottomlands and greatest in the larger valleys. Organic matter content and fertility are high in Lawson soils, which are well suited to corn and soybean production. Areas that flood frequently are suited to pasture or woodland.

Huntsville soils are moderately well and well drained and commonly occur on higher lying areas or natural levees near the stream channel or in small bottomlands that have good underdrainage. The surface soil is a very dark brown or very dark grayish-brown silt loam about 24 to 36 inches thick. The subsoil and underlying material are dark brown silt loams. Sand content often increases somewhat below depths of 50 to 60 inches. Drainage is not needed on Huntsville soils. The main problem is flooding, but in some places streambank cutting is also a hazard. Huntsville soils are high in organic matter content. They are fertile soils and are well suited to corn and soybean production. In the smaller bottomlands, these soils are often used for pasture. A few areas are in

woodland. Huntsville soils occupy about 20 percent of this soil association.

Orion soils are somewhat poorly drained. They occur in the smaller stream valleys where light-colored sediments eroded from nearby upland forest soils have accumulated in bottomlands over dark-colored soils. The light-colored sediments range from 20 to 40 inches thick and are dark grayish-brown or brown silt loams. The dark-colored buried soil is a black or dark grayish-brown silt loam or light silty clay loam. (Without the light-colored, overlying deposits, the dark-colored buried soil would frequently be classified as Lawson soils.) Orion soils can be tiled where suitable outlets are available. However, they are variable in the need for additional drainage, and many areas have sufficient natural underdrainage for production of such crops as corn. These soils are low to moderate in organic matter content, and fertility is generally moderate to high. Where flooding is not frequent, they are well suited to corn and soybean production. Many areas, because they are small or flood frequently, are used for pasture or woodland. Orion soils occupy about 15 percent of this association.

Minor soils in this association are Radford, Sawmill, Otter, and others. They occupy about 25 percent of this association. Radford soils are somewhat poorly drained, moderately permeable, dark-colored soils. The surface 20 to 40 inches is a very dark grayish-brown silt loam. The underlying material is a black silty clay loam, similar in many respects to the Sawmill silty clay loam described next. Radford soils occur mainly in the Spoon River valley. They can be tile-drained if suitable tile outlets are available. They are highly productive corn and soybean soils where flooding is not too frequent. The Sawmill soils, for the most part, occur in swales and low areas in the Spoon River valley. They are naturally poorly drained, thus requiring additional drainage for the production of such crops as corn and soybeans. They can be tiled, but outlets are sometimes a problem — deep, open ditches may be necessary for the tile outlets. The surface soil is a black silty clay loam 24 to 36 inches thick. The underlying material is a dark gray silty clay loam. Because of their low-lying position, Sawmill soils are frequently wet later in the spring than most soils in this association. However, where drainage has been provided and flooding is not too frequent, these soils are suited to corn and soybean production. Very wet and frequently flooded areas are used for pasture or woodland. Otter soils are poorly drained. They are deep, dark-colored silty soils, similar to the Lawson soils in many respects, except that Otter soils are poorly drained rather than somewhat poorly drained. Tile can be used for drainage if outlets are available. Besides wetness, flooding is a serious hazard, more serious on Otter soils than on Lawson soils. Where these hazards are difficult to overcome, Otter soils are often used for pasture or woodland.

The Lawson-Huntsville-Orion soil association is intensively cropped to corn and soybeans, crops that can usually be planted after spring floods subside and harvested in the fall without undue flood damage. However, in some years, these bottomland soils sustain severe crop damage. Drainage problems on some of the soils and flooding are the main management problems. Where these hazards are minimal, all of the soils of this association are very productive for corn and soybeans. Well-managed pastures and stands of trees are also highly productive on these soils.

SM. Strip-Mined Land

Strip-Mined Land occupies approximately 21,000 acres or 4.5 percent of Knox County in two general areas of concentration. One is in the vicinity of Victoria, slightly north of the east-central portion of the county. The other is in the southeastern part of the county, generally south of Yates City and east of Rapatee.

Strip-Mined Land represents areas of extreme variability in materials and slope where the natural soil has been greatly disturbed. Slopes range from very steep to gently sloping; the gentle slopes occur where materials have been leveled in some of the more recently stripped areas. These materials represent various layers or mixtures of loess, glacial till, and bedrock (mainly shale). Surface textures are variable but are dominantly loam and clay loam. Poor soil tilth or lack of desirable soil structure may be an important limitation. The content of stones and rocks varies from area to area, making cultivation difficult or impossible in some places. The degree of acidity or alkalinity is also variable but is mainly in the slightly acid to alkaline range. The most acid areas are those where acid shale bedrock is an important part of the surface material. The size and shape of areas are variable and irregular, and small lakes often are present. There are usually elongated areas of impounded water on the borders or margins of stripped areas. Some of these areas could be a source for irrigation water, where irrigation is feasible.

Some of the older areas of Strip-Mined Land, which have grown up in trees and brush, support wildlife and afford some recreational activities. Some sloping to moderately steep areas have been seeded to grass-legume mixtures and are used for pasture or occasional hay crops. Some areas, leveled with careful reclamation management, now range in slope from nearly level to sloping and are supporting small grains, mainly wheat, and occasionally row crops such as corn and soybeans. Establishment of vegetation is difficult in a few areas. Cultivated crops may require above-normal amounts of fertilizer, particularly nitrogen, because of the low organic matter content of most of the surface materials. The most productive areas are those where loess materials or slightly acid to neutral glacial till make up the surface few feet of the disturbed areas. Housing developments may be adapted to some areas. Mason Heights, north of Spoon Lake in the eastern part of the county, is an example of this kind of land use.

The use of Strip-Mined Land is highly dependent upon the slope of the land and the nature of the upper 4 to 5 feet of material. As indicated above, some areas are best adapted to wildlife or recreational activities. Carefully reclaimed and leveled areas can produce crops commonly grown in the area. Special management, including soil chemical tests and special fertilization practices, may be needed.

LF. Landfill

Landfills are excavations in which refuse is deposited and covered with soil material. In Knox County one landfill is located about 3 miles south of Galesburg and another small one is near Wataga. The final cover on landfills is usually at least 2 feet thick and varies in texture according to the soil material used.

CP. Clay Pit

Clay pits are excavations in which clayey soil material, shale, or coal underclays have been removed and used to make brick, tile, or other clay-fired products. One such pit is located about 2 miles east of Galesburg in Knox County. The materials exposed and left in clay pits are quite variable, depending upon the soil material and the rock strata exposed in digging the desired clay.

BA. Borrow Area

Borrow areas are usually pits from which soil material has been removed for road fill, dikes, levees, or other earthen structures. Some borrow areas are capable of holding water; those that do are classified as ponds or water. Some that are relatively shallow may be difficult to vegetate because undesirable soil material or rock strata are exposed. One borrow area is shown on the Knox County soil map, just northeast of Galesburg near I-74.

LQ. Limestone Quarry

Only one limestone quarry was mapped in Knox County. It is about 2 miles northwest of St. Augustine, which is in the southwestern part of the county. Limestone quarries are difficult to reclaim because rock and materials high in lime are left exposed.

W. Water

Only the larger lakes are shown on the Knox County soil map: Spoon Lake, Rice Lake, the lake a few miles northwest of Galesburg, Lake Bracken, and Horseshoe Lake. There are also numerous farm ponds in Knox County and many elongated ponds or bodies of water in the strip-mined areas.

SOIL FEATURES OF KNOX COUNTY

Various features of Knox County soils that influence their use and management are listed in Table 2 and discussed below.

Percent slope refers to the gradient, or feet of vertical rise or fall in a horizontal distance of 100 feet. Nearly level to depressional areas tend to have water runon from higher areas, whereas steeper or more sloping areas have runoff, less water infiltration, and, consequently, more erosion. As slope increases, machinery is harder to operate, erosion becomes more difficult to control, and yields are less.

In Table 2 the dominant slope of individual soils in each soil association is given in percent. Also, as in several other tables in the text, the general slope class of the entire soil association is given by the capital letter following the soil association area number.

The range in percent slope and the name of the slope group of each soil association slope letter are as follows:

Slope letter	*Range in percent slope*	*Name of slope group*
A	0 to 2	Nearly level
B	2 to 5	Gently sloping
AB	0 to 5	Nearly level to gently sloping
C	5 to 10	Sloping
CD	5 to 15	Sloping to strongly sloping
EF	15 to 30	Moderately steep to steep
EG	15 to more than 30	Moderately steep to very steep

Combinations of slope letters, such as AB or CD, were used where it was impractical to show separate slope groups on the map at the scale that was used.

Percent organic matter is the content of the organic portion of the soil — the remains of plants and animals. Nutrients such as nitrogen and phosphorus are held, in part, by the organic matter of the soil and are released for plant use as the organic matter decomposes. Organic matter also helps bind soil particles into aggregates, thus helping stabilize soil structure, prevent crusting, and retard removal or loss of soil by erosion. Herbicide effectiveness depends to some extent upon organic matter content of the soil, so that rates of application are adjusted according to the percentage of organic matter. The influence of organic matter on lime requirement is discussed in the section on lime group (page 22).

Soil texture refers to the relative proportions of sand, silt, and clay in the soil. Most soils of Knox County have silt loam surface layers and silty clay loam subsoils. However, in those soil associations that have been moderately to severely eroded, many soils have lost the silt loam surface layer and have the silty clay loam subsoil exposed at the surface. Silt loams are easy to work and hold moisture well, but they are erosive and subject to crusting and frost heaving. Silty clay loams are sticky when wet, and hard and often cloddy when dry. Good seed beds are usually harder to prepare in silty clay loams than in silt loams.

Table 2. Features of Knox County Soils

Soil association	Soil series	Percent slope	Percent organic matter	Soil texture[a]		Internal soil drainage	Profile permeability	Water erosion hazard	Flood hazard[b]	Lime group[c]	Phosphorus-supplying power[c]	Potassium-supplying power[c]
				Surface	Subsoil							
3A	Ipava	0–2	4.5	sil	hv. sicl	Somewhat poor	Moderate	Slight	Slight	B	Medium	High
	Sable	0–1	5.5	sicl	sicl	Poor	Moderate	Slight	Ponding	A	Low	Medium
	Hartsburg	0–1	4.0	sicl	sicl	Poor	Moderate	Slight	Ponding	A	Low	Medium
	Denny	0–1	3.5	sil	hv. sicl	Poor	Slow	Slight	Ponding	C	Low	Low
	Harpster	0–1	5.5	sicl	sicl	Poor	Moderate	Slight	Ponding	A	Low	Low
3B	Ipava	2–3	4.5	sil	hv. sicl	Somewhat poor	Moderate	Slight	Slight-none	B	Medium	High
	Tama	2–5	3.8	sil	sicl	Mod. well-well	Moderate	Slight	None	B	High	High
	Sable	0–1	5.5	sicl	sicl	Poor	Moderate	Slight	Ponding	A	Low	Medium
	Denny	0–1	3.5	sil	hv. sicl	Poor	Slow	Slight	Ponding	C	Low	Low
3C[d]	Tama	5–10	3.2	sil-sicl	sicl	Mod. well-well	Moderate	Mod.-severe	None	B	High	High
	Elkhart	7–10	2.8	sil-sicl	sicl	Well	Moderate	Mod.-severe	None	B	Medium	Medium
	Downs	5–10	2.8	sil-sicl	sicl	Mod. well-well	Moderate	Mod.-severe	None	C	High	Medium
	Assumption	7–10	3.0	sil-sicl	sicl	Mod. well-well	Mod.-mod. slow	Mod.-severe	Seepage	B	High	Medium
26A	Keomah	0–2	2.0	sil	hv. sicl	Somewhat poor	Mod. slow	Slight	Slight	C	High	Medium
	Rushville	0–1	2.0	sil	hv. sicl-sic	Poor-v. poor	Slow-very slow	Slight	Ponding	C	Medium	Low
	Clarksdale	0–2	3.0	sil	hv. sicl	Somewhat poor	Mod. slow	Slight	Slight	C	Medium	Medium
26AB	Keomah	1–3	2.0	sil	hv. sicl	Somewhat poor	Mod. slow	Slight	Slight-none	C	High	Medium
	Clinton	2–5	2.0	sil	hv. sicl	Mod. well-well	Mod. slow	Slight	None	C	High	Medium
	Clarksdale	0–3	3.0	sil	hv. sicl	Somewhat poor	Mod. slow	Slight	Slight	C	Medium	Medium
	Downs	2–5	3.0	sil	sicl	Mod. well-well	Moderate	Slight	None	C	High	Medium
	Rushville	0–1	2.0	sil	hv. sicl-sic	Poor-v. poor	Slow-very slow	Slight	Ponding	C	Medium	Low
26CD[d]	Clinton	5–15	1.0	sicl	hv. sicl	Mod. well-well	Mod. slow	Mod.-severe	None	B	High	Medium
	Hickory	10–15	.7	l	cl	Mod. well-well	Moderate	Mod.-severe	None	D	Low	Medium
	Atlas	7–15	.7	sicl	sic	Somewhat poor	Very slow	Severe	Seepage	B	Low	Low
	Ursa	7–15	.7	sicl	sic	Mod. well	Mod. slow-slow	Severe	Seepage	B	Low	Low
	Fishhook	5–10	1.5	sicl	hv. sicl-sic	Somewhat poor	Slow	Severe	Seepage	B	Low	Low
26EF[d]	Clinton	15–30	1.0	sicl	hv. sicl	Mod. well-well	Mod. slow	Severe	None	B	High	Medium
	Hickory	15–30	.7	l	cl	Mod. well-well	Moderate	Severe	None	D	Low	Medium
	Gosport	20–30	.7	sicl	sic	Mod. well	Very slow	Very severe	Seepage	B	Low	Low
	Hennepin	20–30	.7	l	l	Well	Mod.-mod. slow	Very severe	None	B	Low	Low
26EG[d]	Hickory	20–30+	.7	hv. l	cl	Mod. well-well	Moderate	Severe	None	D	Low	Medium
	Gosport	25–30+	.7	sicl	sic	Mod. well	Very slow	Very severe	Seepage	B	Low	Low
	Clinton	15–30+	.8	sicl	hv. sicl	Mod. well-well	Mod. slow	Severe	None	B	High	Medium
	Hennepin	25–30+	.7	l	l	Well	Mod.-mod. slow	Very severe	None	B	Low	Low
40B	St. Charles	2–5	2.0	sil	sicl	Mod. well-well	Moderate	Slight	None-slight	C	High	Medium
	Batavia	2–5	3.0	sil	sicl	Mod. well-well	Moderate	Slight	None-slight	C	High	Medium
	Virgil	1–3	3.0	sil	sicl	Somewhat poor	Moderate	Slight	None-slight	C	Medium	Medium
	Kendall	1–3	2.0	sil	sicl	Somewhat poor	Moderate	Slight	None-slight	C	High	Medium
40C[d]	St. Charles	5–10	1.0	sicl	sicl	Mod. well-well	Moderate	Mod.-severe	None	B	High	Medium
	Camden	7–10	1.0	sicl	sicl	Mod. well-well	Moderate	Mod.-severe	None	B	Medium	Medium
	Batavia	5–10	2.8	sicl	sicl	Mod. well-well	Moderate	Mod.-severe	None	B	High	Medium
40CD[d]	Camden	10–15	.8	sicl	sicl	Mod. well-well	Moderate	Severe	None	B	Medium	Medium
	St. Charles	7–15	1.0	sicl	sicl	Mod. well-well	Moderate	Severe	None	B	High	Medium

43B	Worthen	2–5	3.8	sil	sil	Mod. well-well	Moderate	Slight	Slight	B	High	High
	Littleton	1–3	4.2	sil	sil	Somewhat poor	Moderate	Slight	Moderate	B	Medium	Medium
	Raddle	2–5	3.6	sil	sil	Mod. well-well	Moderate	Slight	Slight	B	High	High
	Coffeen	1–3	4.0	sil	sil	Somewhat poor	Moderate	Slight	Moderate	B	Medium	Medium
69A	Lawson	0–1	4.0	sil	sil	Somewhat poor	Moderate	Slight	Mod.-severe	B	Med.-high	Medium
	Huntsville	1–2	3.5	sil	sil	Mod. well-well	Moderate	Slight	Mod.-severe	B	High	High
	Orion	0–2	2.0	sil	sil	Somewhat poor	Moderate	Slight	Mod.-severe	C	Med.-high	Medium
	Radford	0–2	3.5	sil	sicl	Somewhat poor	Moderate	Slight	Mod.-severe	B	Med.-high	Medium
	Sawmill	0–1	4.5	sicl	sicl	Poor	Mod.-mod. slow	Slight	Severe	A	Medium	Medium
	Otter	0–1	5.5	sil	sil	Poor	Moderate	Slight	Severe	B	Medium	Medium

[a] Textures are cl, clay loam; hv., heavy; l, loam; sic, silty clay; sil, silt loam; sicl, silty clay loam.
[b] Moderate: damaging floods occur occasionally during summer growing season; none: water tends to run off; ponding: water tends to accumulate at times from nearby, higher lying soils; seepage: water moves laterally and seeps out on slopes; severe: serious flooding occurs at times during summer growing season; slight: flooding from streams or ponding unlikely but can occur occasionally during very wet periods.
[c] Lime group, phosphorus-supplying power, and potassium-supplying power are useful in interpreting soil test results. See Illinois *Agronomy Handbook* for necessary information.
[d] Moderate to severe erosion conditions assumed.

Table 3. Estimated Crop Yields of Knox County Soils Under a High Level of Management[a]

Soil association	Soil series	Percent slope	Estimated crop yields per acre: Corn (bu.)	Soybeans (bu.)	Wheat (bu.)	Oats (bu.)	Alfalfa hay (tons)	Mixed pasture (days)[b]
3A	Ipava	0–2	158	50	64	90	6.0	300
	Sable	0–1	151	49	59	83	5.6	280
	Hartsburg	0–1	140	46	55	78	5.3	265
	Denny	0–1	109	36	45	60	4.0	200
	Harpster	0–1	131	43	50	72	5.0	250
3B	Ipava	2–3	156	48	62	88	5.9	295
	Tama	2–5	149	44	59	86	5.8	290
	Sable	0–1	151	49	59	83	5.6	280
	Denny	0–1	109	36	45	60	4.0	200
3C[c]	Tama	5–10	136	38	51	74	5.1	255
	Elkhart	7–10	110	31	44	61	4.3	215
	Downs	5–10	118	36	49	68	4.7	235
	Assumption	7–10	104	31	44	62	3.9	195
26A	Keomah	0–2	123	37	50	70	5.0	250
	Rushville	0–1	109	35	46	63	4.2	210
	Clarksdale	0–2	135	42	56	78	5.3	265
26AB	Keomah	1–3	122	36	49	69	4.9	245
	Clinton	2–5	120	39	52	70	5.1	255
	Clarksdale	0–3	134	41	55	77	5.2	260
	Downs	2–5	136	42	57	81	5.5	275
	Rushville	0–1	109	35	46	63	4.2	210
26CD[c]	Clinton	5–15	96	31	42	56	4.1	205
	Hickory	10–15	40	16	28	32	2.4	120
	Atlas	7–15	35	15	22	32	2.3	115
	Ursa	7–15	45	18	25	33	2.4	120
	Fishhook	5–10	60	22	30	35	2.4	120
26EF[c]	Clinton	15–30	90	29	35	50	3.8	190
	Hickory	15–30	NA	NA	22	28	2.0	100
	Gosport	20–30	NA	NA	NA	NA	1.4	70
	Hennepin	20–30	NA	NA	20	25	1.9	95
26EG[c]	Hickory	20–30+	NA	NA	NA	NA	1.6	80
	Gosport	25–30+	NA	NA	NA	NA	1.2	60
	Clinton	15–30+	NA	NA	25	40	3.0	150
	Hennepin	25–30+	NA	NA	NA	NA	1.8	90
40B	St. Charles	2–5	120	37	51	70	5.0	250
	Batavia	2–5	131	41	54	78	5.3	265
	Virgil	1–3	142	44	58	82	5.6	280
	Kendall	1–3	129	40	57	73	5.2	260
40C[c]	St. Charles	5–10	102	32	43	60	4.3	215
	Camden	7–10	99	31	42	58	4.1	205
	Batavia	5–10	111	35	46	66	4.5	225
40CD[c]	Camden	10–15	93	29	40	55	3.8	190
	St. Charles	7–15	97	30	42	57	3.9	195
43B	Worthen	2–5	145	42	57	81	5.8	290
	Littleton	1–3	153	45	65	85	5.9	295
	Raddle	2–5	140	38	51	73	5.1	255
	Coffeen	1–3	145	44	58	77	5.2	260
69A	Lawson	0–1	144	45	58	79	5.6	280
	Huntsville	1–2	142	46	59	81	5.7	285
	Orion	0–2	125	40	48	68	4.8	240
	Radford	0–2	133	44	58	81	5.5	275
	Sawmill	0–1	139	44	52	72	5.4	270
	Otter	0–1	133	43	47	65	4.6	230

[a] Adapted from Illinois Extension Circular 1016, *Productivity of Illinois Soils*. Uneroded conditions are assumed except as noted. Also, yields on bottomland soils assume no damage from flooding.
[b] Expected number of days that one acre will carry one cow.
[c] Yields given are for moderately to severely eroded conditions.
NA = not adapted.

Most of silty clay loam subsoils in Knox County have rather good structural development and thus are penetrable by roots of crop plants. They normally provide the major soil moisture reserves to crops during dry periods.

Silty clay subsoils contain more clay than do silty clay loams and thus are usually less permeable to water, air, and plant roots.

Internal soil drainage indicates the degree to which the soil is saturated with water under natural conditions; in a general way, this indicates the depth to the water table. Well-drained soils drain freely and are not saturated with water for any significant periods. Moderately well-drained soils are saturated in the lower subsoil for brief periods in the early spring. In both well-drained and moderately well-drained soils, the water table is below 4 or 5 feet most of the year and seldom interferes with crop growth. Somewhat poorly drained soils have a water table in the upper subsoil from 1 to 3 feet deep for several months in the spring; poorly drained soils are usually saturated and have a water table at 0 to 2 feet deep in late winter and spring. Soils with high water tables have severe limitations for such uses as septic tank filter fields and building sites.

Internal natural drainage of poorly drained and somewhat poorly drained soils is ordinarily improved by tiling and ditching. Most of the soils of Knox County that require improved drainage for many uses are permeable enough to be tile drained. Denny and Rushville soils, however, because of their slow or very slow permeability, drain so slowly that tile are seldom if ever effective on them.

Profile permeability refers to the rate of water movement through the soil profile. The permeabilities given in Table 2 are for the most limiting layers or horizons in the soil profiles. Moderate profile permeability is usually the most desirable, and most soils of Knox County have moderate permeability. Those that require additional drainage can be tile drained, except Denny and Rushville, as indicated above. A few soils with slow or very slow permeability, such as Atlas, Ursa, Fishhook, and Gosport, occur on slopes; except for some side-hill seepage spots, erosion control is usually more serious than improving drainage. Sloping soils with slow or very slow permeability have more runoff than the more permeable soils and thus are subject to more erosion.

Water erosion hazard refers to the danger or probability of serious erosion of soils when cultivated. In general, the erosion hazard increases as slope increases and as profile permeability decreases. Soils with a slight erosion hazard have a wide range of uses without excessive erosion. Soils with a severe erosion hazard have a more limited range of uses unless erosion control measures are applied to reduce the soil losses to acceptable levels.

Although not considered in Table 2, wind erosion is sometimes a serious problem on fall-plowed soils in Knox County in dry late winter and spring. Leaving the plowed surface somewhat rough and partially covered with some crop residues will help control this kind of erosion.

Flood hazard is often difficult to evaluate but is used to indicate the probability of ponding and flooding, which may seriously reduce crop yields or hinder some uses of soils such as for building sites. Soils subject to ponding, even though ponding may occur only occasionally, are not good building sites. Buildings should not, of course, be placed on bottomland soils subject to moderate or severe flooding.

Flood hazard is often more variable than many other soil features on a given soil. For example, a soil in a small bottomland that receives runoff from a small watershed may have a much lower flood hazard than the same soil in a large bottomland and a large watershed.

Besides ponding and flooding hazards, seepage is indicated as a hazard in Table 2 on some sloping, slowly permeable soils of Knox County.

Lime group can be used as an aid in interpreting soil tests results, as reported on Soil Test Form D-2, available through your county adviser. Soils in Lime Group A are dark (high organic matter) silty clays and silty clay loams. Some Group B soils are light (low organic matter) and moderately dark (medium organic matter) silty clays and silty clay loams; others are dark (high organic matter) silt loams and clay loams. Group C soils are light and moderately dark silt loams and clay loams, dark sandy loams, or dark and moderately dark loams. Group D soils are light-colored loams, light and moderately dark sandy loams, and all sands. Color and texture refer to characteristics of the plow layer.

Phosphorus-supplying power refers to a soil's ability to provide phosphorus for use by plants. Knox County soils that formed from loess and are well drained have high phosphorus-supplying power. Yield increases from additional applications of phosphorus fertilizer are likely to be small on these soils. Phosphorus-supplying power decreases as natural drainage and aeration decrease. Soils that developed from thin loess, glacial till, or bedrock are usually low in phosphorus-supplying power. Soils that occur on terraces and bottomlands are variable in this ability.

Potassium-supplying power refers to a soil's ability to provide potassium for use by plants. The potassium-supplying power of a soil decreases as weathering of the soil increases. Knox County soils that developed in loess are usually medium or high in potassium-supplying power. Glacial till and sandy soils are usually low in this quality.

Lime group, phosphorus-supplying power, and potassium-supplying power can be used as aids in interpreting soil test results. Additional information is available in the *Agronomy Handbook* (available from your county adviser or from the Office of Agricultural Publications, 123 Mumford Hall, Urbana, IL 61801 for $1.00) and on Soil Test Report Forms D-1, D-2, D-3, and D-4.

CROP YIELD ESTIMATES

Crop yield estimates for a high level of management have been updated from those given in Illinois Extension Circular 1016, *Productivity of Illinois Soils.* The yields given in Table 3 are for soils that are not flooded or eroded, except that for the sloping to very steep soils in association 3C, 26CD, 26EF, 26EG, 40C, and 40CD the yields are for moderately to severely eroded conditions. A high level of management includes drainage improvement, control of erosion to prevent further undue soil loss, adequate liming and fertilizing, and other improved cultural practices. For further information on the effects of soil properties and soil management on yields, see Illinois Extension Circular 1016, *Productivity of Illinois Soils.*

SOIL LIMITATIONS FOR SELECTED USES

Soil association limitations for selected uses are given in Table 4 for the various soil associations shown on the Knox County general soil map. Making interpretations for soil associations is complicated since each association is made up of two or more soils that often differ in drainage and other important characteristics. Therefore, some of the interpretations given in Table 4 show a range in limitations or suitabilities, while others tend to show the average situation. Interpretations for individual soils are given in Table 5. *In both Tables 4 and 5, on-site investigations are necessary for evaluating soil suitability for many of the uses.*

Although the term prime agricultural land implies the very best land, three grades of prime land have been used here: A — excellent, B — very good, and C — good. These grades are based on the productivity of the four major grain crops in Illinois (corn, soybeans, wheat, and oats) under a high level of management. Corn yields under high management have also been evaluated in conjunction with productivity of the four major grain crops. The ranges in productivity indexes (PI's) and corn yields for the three grades of prime agricultural land are as follows:

	PI	*Corn yield (bu./A.)*
Grade A	141 to 160	140 to 161
Grade B	126 to 140	123 to 139
Grade C	106 to 125	101 to 122

Both productivity indexes and corn yields are based on long-time yield records and trends. Computations for this publication are as of 1976.

Land with productivity indexes and corn yields lower than the minimum requirements for grade C are desig-

Table 4. Estimated Limitations of Soil Associations for Selected Uses[a]

Soil association	Percent of county	Percent of slope	Internal soil drainage	Native vegetation	Landscape position[b]	Grade of prime agr. land[c]	Septic tank absorption fields
3A	19.3	0–2	Somewhat poor-poor	Prairie	Upland	A	Severe
3B	21.5	2–5	Somewhat poor-poor	Prairie	Upland	A	Mod. or sl. to severe
3C	6.9	5–10	Well-moderately well	Prairie	Upland	B	Slight
26A	.3	0–2	Somewhat poor-poor	Forest	Upland	C	Severe
26AB	11.7	0–5	Somewhat poor-poor	Forest	Upland	B	Mod. or sl. to severe
26CD	13.1	5–15	Well-moderately well	Forest	Upland	Other	Mod. to sev.
26EF	8.2	15–30	Well-moderately well	Forest	Upland	Other	Severe
26EG	3.4	15–30+	Well-moderately well	Forest	Upland	Other	Severe
40B	.6	2–5	Well-somewhat poor	Forest	Terrace	B	Slight
40C	.5	5–10	Well-moderately well	Forest	Terrace	C	Slight
40CD	.1	5–15	Well-moderately well	Forest	Terrace	Other	Moderate
43B	.4	2–5	Well-somewhat poor	Prairie	Terrace	A	Mod. or sl. to severe
69A	8.9	0–2	Moderately well-poor	Forest and prairie	Bottomland	B	Severe
SM	4.5	Disturbed[d]	Disturbed	Disturbed	Disturbed	Strip-mined	Disturbed
LF	.1	Disturbed	Disturbed	Disturbed	Disturbed	Other	Disturbed
CP	.1	Disturbed	Disturbed	Disturbed	Disturbed	Other	Disturbed
BA	.1	Disturbed	Disturbed	Disturbed	Disturbed	Other	Disturbed
LQ	.1	Disturbed	Disturbed	Disturbed	Disturbed	Other	Disturbed
Water	.2	Water	Water	Water	Water	Water	Water

[a] For a discussion of the factors used in rating soil associations, see pages 26-27. These factors are the same as those used for rating individual soils.

[b] Uplands are considered as not being subject to flooding although ponding occurs at times on very flat or depressional soils. Terraces are considered as having unlikely or infrequent flooding. Bottomlands are generally subject to flooding.

[c] See above for discussion of the grades used here.

[d] Percent slope and other limitations are not given for strip mines, landfills, clay pits, borrow areas, and limestone quarries. Instead, the word "disturbed" is used to indicate disturbance by man and usually highly variable conditions.

Soil association	Soil series	Percent of association	Dominant slope percent	Intensive cropping	Drainage[b]	Septic tank absorption fields	Sewage lagoon areas	Dwellings with basements[c]
3A	Ipava	50	0–2	Slight	Moderate 6	Severe 6	Slight	Severe 6, 9
	Sable	45	0–1	Slight	Severe 4, 5	Severe 4, 5	Severe 5	Severe 4, 5
	Minor soils	5						
	Hartsburg		0–1	Slight	Severe 4, 5	Severe 4, 5	Severe 5	Severe 4, 5
	Denny		0–1	Moderate 3, 4	Severe 3, 4, 5	Severe 3, 4, 5	Slight	Severe 4, 5, 9
	Harpster		0–1	Slight	Severe 4, 5	Severe 4, 5	Severe 5	Severe 4, 5
3B	Ipava	54	2–3	Slight	Moderate 6	Severe 6	Moderate 1, 19	Severe 6, 9
	Tama	40	2–5	Slight	Slight	Slight	Moderate 19	Slight
	Minor soils	6						
	Sable		0–1	Slight	Severe 4, 5	Severe 4, 5	Severe 5	Severe 4, 5
	Denny		0–1	Moderate 3, 4	Severe 3, 4, 5	Severe 3, 4, 5	Slight	Severe 4, 5, 9
3C	Tama	65	5–10	Moderate 2	Slight	Slight	Moderate 1, 19	Slight
	Elkhart	15	7–10	Moderate 2	Slight	Moderate 1	Moderate 1, 19	Moderate 1
	Downs	15	5–10	Moderate 2	Slight	Slight	Moderate 1, 19	Moderate 9, 11
	Minor soils	5						
	Assumption		7–10	Moderate 2, 3, 8	Moderate 3, 7, 8	Severe 1, 3, 7, 8	Severe 1	Moderate 1, 9
26A	Keomah	50	0–2	Slight	Moderate 6	Severe 3, 6	Slight	Severe 6, 9
	Rushville	25	0–1	Moderate 3, 4	Severe 3, 4, 5	Severe 3, 4, 5	Slight	Severe 4, 5, 9
	Clarksdale	25	0–2	Slight	Moderate 6	Severe 3, 6	Severe 6	Severe 6
26AB	Keomah	35	1–5	Slight	Moderate 6	Severe 3, 6	Moderate 1, 19	Severe 6, 9
	Clinton	35	2–5	Slight	Slight 7	Severe 3, 7	Moderate 19	Moderate 7, 9
	Clarksdale	20	0–3	Slight	Moderate 6	Severe 3, 6	Severe 6	Severe 6
	Minor soils	10						
	Downs		2–5	Slight	Slight	Slight	Moderate 19	Moderate 9, 11
	Rushville		0–1	Moderate 3, 4	Severe 3, 4, 5	Severe 3, 4, 5	Slight	Severe 4, 5, 9
26CD	Clinton	50	5–15	Moderate 2	Slight	Severe 1, 3, 7	Severe 1	Moderate 1, 7, 9
	Hickory	25	10–15	Severe 1, 2	Slight	Moderate 1, 3	Severe 1	Moderate 1, 9
	Minor soils	25						
	Atlas		7–15	Severe 2, 3, 8	Moderate 3, 6, 8	Severe 1, 3, 6, 8	Severe 1	Severe 1, 6, 9
	Ursa		7–15	Severe 2, 3, 8	Moderate 3, 7, 8	Severe 1, 3, 7, 8	Severe 1	Severe 1, 9
	Fishhook		5–10	Moderate 2, 3, 8	Moderate 3, 6, 8	Severe 3, 6, 8	Severe 1	Severe 1, 9
26EF	Clinton	35	15–30	Severe 1, 2	Slight	Severe 1	Severe 1	Severe 1
	Hickory	30	15–30	Severe 1, 2	Slight	Severe 1	Severe 1	Severe 1
	Gosport	30	20–30	Severe 1, 2, 3, 18	Slight	Severe 1, 3, 18	Severe 1, 18	Severe 1, 14, 18
	Minor soils	5						
	Hennepin		20–30	Severe 1, 2	Slight	Severe 1	Severe 1	Severe 1
26EG	Hickory	40	20–30+	Severe 1, 2	Slight	Severe 1	Severe 1	Severe 1
	Gosport	35	25–30+	Severe 1, 2, 3, 18	Slight	Severe 1, 3, 18	Severe 1, 18	Severe 1, 14, 18
	Clinton	20	15–30+	Severe 1, 2	Slight	Severe 1, 18	Severe 1, 18	Severe 1
	Minor soils	5						
	Hennepin		25–30+	Severe 1, 2	Slight	Severe 1	Severe 1	Severe 1
40B	St. Charles	40	2–5	Slight	Slight 7	Slight	Moderate 19	Slight
	Batavia	35	2–5	Slight	Slight 7	Slight	Moderate 19	Slight
	Minor soils	25						
	Virgil		1–3	Slight	Moderate 6	Severe 6	Severe 6, 19	Severe 6
	Kendall		1–3	Slight	Moderate 6	Severe 6	Severe 6, 19	Severe 6
40C	St. Charles	45	5–10	Moderate 2	Slight	Slight 1	Severe 1, 19	Moderate 1
	Camden	40	7–10	Moderate 2	Slight	Moderate 1, 7	Severe 1, 19	Moderate 1
	Minor soils	15						
	Batavia		5–10	Moderate 2	Slight	Slight 1	Severe 1, 19	Moderate 1
40CD	Camden	50	10–15	Moderate 2	Slight	Moderate 1, 19	Severe 1	Moderate 1
	St. Charles	50	7–15	Moderate 2	Slight	Moderate 1, 19	Severe 1	Moderate 1

[a] Some ratings may be revised when additional information becomes available. The numbers following the ratings refer to the following limiting soil characteristics:

1 = slope is too great
2 = erosion has already damaged or may damage soil
3 = permeability is too slow
4 = flooding or ponding occurs at times
5 = seasonal high water table at 0 to 2 feet below the surface
6 = seasonal high water table at 1 to 3 feet below the surface
7 = seasonal high water table at 3 to 6 feet below the surface
8 = subject to side-hill seepage
9 = moderate to high shrink-swell potential
10 = susceptible to frost heave

or Suitability for Selected Uses[a]

	Pond sites		Recreation		Suitability as a source of	
Local roads and streets	Reservoir areas	Embankments, dikes, and levees	Picnic areas	Playgrounds	Road fill	Topsoil
Severe 6, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Moderate 6	Moderate 6	Poor 9, 10, 11	Fair 6
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 5	Severe 5	Poor 5, 10, 11	Poor 5
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 4, 5	Severe 4, 5	Poor 5, 10, 11	Poor 5, 17
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 4, 5	Severe 4, 5	Poor 5, 9, 10, 11	Poor 5, 16
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 4, 5	Severe 4, 5	Poor 5, 10, 11	Poor 5, 17
Severe 6, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Moderate 6	Moderate 6	Poor 9, 10, 11	Fair 6
Moderate 10, 11	Seepage 19	Shrink-swell 9, 11, 12	Slight	Slight	Poor 10, 11	Good
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 5	Severe 5	Poor 5, 10, 11	Poor 5
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 5	Severe 5	Poor 5, 9, 10	Poor 5
Moderate 10, 11	Seepage 19	Shrink-swell 9, 11, 12	Slight	Severe 1	Poor 10, 11	Fair 16
Moderate 10, 11	Seepage 19	Shrink-swell 9, 11, 12	Slight	Severe 1	Poor 10, 11	Fair 16
Severe 10, 11	Seepage 19	Shrink-swell 9, 11, 12	Slight	Severe 1	Poor 10, 11	Fair 16
Severe 9, 10, 11	Favorable	Shrink-swell 9, 11	Moderate 1	Severe 1	Poor 10, 11	Fair 1, 16
Severe 6, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Moderate 6	Moderate 3, 6	Poor 9, 10, 11	Fair 6, 16
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 5	Severe 5	Poor 5, 9, 10	Poor 5
Severe 6, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Moderate 6	Moderate 6	Poor 9, 10	Fair 16
Severe 6, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Moderate 6	Moderate 3, 6	Poor 9, 10, 11	Fair 6, 16
Severe 9, 10, 11	Favorable	Favorable	Slight	Moderate 1	Poor 9, 10	Fair 16
Severe 6, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Moderate 6	Moderate 6	Poor 9, 10	Fair 16
Severe 10, 11	Seepage 19	Shrink-swell 9, 11, 13	Slight	Moderate 1	Poor 10, 11	Good
Severe 5, 9, 10, 11	Favorable	Shrink-swell 9, 11, 13	Severe 5	Severe 5	Poor 5, 9, 10	Poor 5
Severe 9, 10, 11	Favorable	Favorable	Slight	Severe 1	Poor 9, 10	Fair 16
Severe 10, 11	Slope 1	Low strength 9, 11	Moderate 1	Moderate 1	Poor 9, 10, 11	Fair 16
Severe 6, 9, 10	Favorable	Compressible 9, 11, 13	Moderate 1, 6	Severe 1, 3, 6	Poor 9, 10	Poor 16, 17
Severe 9, 10	Favorable	Compressible 9, 11, 13	Moderate 1	Severe 1, 3	Poor 9, 10	Poor 16, 17
Severe 6, 9, 10	Favorable	Compressible 9, 11, 13	Moderate 1, 6	Severe 1, 3, 6	Poor 9, 10	Poor 16, 17
Severe 1, 10, 11	Slope 1	Favorable	Severe 1	Severe 1	Poor 9, 10	Fair 16
Severe 1, 10	Slope 1	Low strength 9, 11	Severe 1	Severe 1	Poor 9, 10, 11	Poor 1
Severe 1, 14, 18	Slope 1, 18	Shrink-swell 9, 14, 18	Severe 1	Severe 1	Poor 9, 11, 17	Poor 16, 17, 18
Severe 1, 10	Slope 1	Favorable	Severe 1	Severe 1	Fair 1, 10	Poor 1, 17
Severe 1, 11	Slope 1	Low strength 9, 11	Severe 1	Severe 1	Poor 9, 10, 11	Poor 1
Severe 1, 14, 18	Slope 1, 18	Shrink-swell 9, 14, 18	Severe 1	Severe 1	Poor 9, 11, 17	Poor 16, 17, 18
Severe 1, 10, 11	Slope 1	Favorable	Severe 1	Severe 1	Poor 9, 10	Fair 16
Severe 1, 10	Slope 1	Favorable	Severe 1	Severe 1	Poor 1	Poor 1, 17
Severe 9, 10, 11	Seepage 19	Favorable	Slight	Moderate 1	Poor 9, 10	Fair 16
Severe 9, 10, 11	Seepage 19	Favorable	Slight	Moderate 1	Poor 9, 10	Fair 16
Severe 6, 9, 10, 11	Seepage 19	Shrink-swell 9, 10, 11	Moderate 6	Moderate 6	Poor 9, 10	Fair 6, 16
Severe 6, 9, 10, 11	Seepage 19	Shrink-swell 9, 10, 11	Moderate 6	Moderate 6	Poor 9, 10	Fair 6, 16
Severe 9, 10, 11	Seepage 19	Favorable	Slight	Severe 1	Poor 9, 10	Fair 16
Severe 9, 10, 11	Seepage 19	Favorable	Moderate 1	Severe 1	Fair 9, 10	Fair 16
Severe 9, 10, 11	Seepage 19	Favorable	Slight	Severe 1	Poor 9, 10	Fair 16
Severe 9, 10, 11	Seepage 19	Favorable	Moderate 1	Severe 1	Fair 9, 10	Fair 16
Severe 9, 10, 11	Seepage 19	Favorable	Moderate 1	Severe 1	Fair 9, 10	Fair 16

11 = low strength of material to support load
12 = piping hazard
13 = compressible; soil volume decreases too much under load
14 = soil slips downslope
15 = soil is sticky and slippery when wet and slow to dry
16 = suitable soil is too thin
17 = borrow areas difficult to reclaim
18 = shallow to bedrock shale
19 = subject to underground seepage, and permeability is too fast

[b] "Slight" indicates that drainage is generally not needed.
[c] This assumes that footings are placed below the depth of frost action.

Soil association	Soil series	Percent of association	Dominant slope percent	Intensive cropping	Drainage[b]	Septic tank absorption fields	Sewage lagoon areas	Dwellings with basements[c]
43B	Worthen	30	2–5	Slight	Slight	Slight	Moderate 3, 19	Slight
	Littleton	25	1–3	Slight	Moderate 6	Severe 4, 6	Severe 4, 6	Severe 4, 6
	Raddle	25	2–5	Slight	Slight	Slight	Moderate 3, 19	Slight
	Minor soils	20						
	Coffeen		1–3	Slight	Moderate 6	Severe 4, 6	Severe 4, 6, 19	Severe 4, 6
69A	Lawson	40	0–1	Slight 4	Moderate 4, 6	Severe 4, 6	Severe 4, 6	Severe 4, 6
	Huntsville	20	1–2	Slight 4	Slight 4, 7	Severe 4	Severe 4	Severe 4
	Orion	15	0–2	Slight 4	Moderate 4, 6	Severe 4, 6	Severe 4, 6	Severe 4, 6
	Minor soils	25						
	Radford		0–2	Slight 4	Moderate 4, 6	Severe 4, 6	Severe 4, 6	Severe 4, 6
	Sawmill		0–1	Slight 4	Severe 4, 5	Severe 4, 5	Severe 4, 5	Severe 4, 5
	Otter		0–1	Slight 4	Severe 4, 5	Severe 4, 5	Severe 4, 5	Severe 4, 5

(See pages 24 and 25 for footnotes.)

nated as "other" lands. "Other" lands are often suitable for such uses as pasture, hayland, woodland, wildlife habitat, or recreation.

Soil limitations for various uses of individual soils in each soil association of Knox County are shown in Table 5. The predominant percent slope of each soil is given; ratings are for those slopes. Some soils that occur in more than one soil association have different slope ranges in different soil associations.

The extent of various soils in each soil association is given in the column on percent of association. The percentage of minor soils given is the total for all the minor soils in a particular association.

The soil association map and Tables 4 and 5 are general guides for interpreting the soil associations and individual soils for various uses. *It must be emphasized that on-site investigations are needed to determine suitability for construction and many other uses.* The interpretations are for the soils in their natural state and not for soils in a disturbed condition, except for reservoir site embankments, dikes and levees, and road fills. The interpretations are generally for a soil depth of 5 feet. For information on materials below 5 feet, consult various geological reports.

Soils rated slight have only minor, if any, limitations for a particular use, and usually the limitations are easily corrected. Soils rated moderate have problems that usually can be overcome by careful design or improved management. Soils with a severe rating are questionable for that particular use. Often the problem causing a severe rating can be overcome, but the needed special design or special management is apt to be costly, sometimes prohibitively so.

For pond sites the soils are listed as favorable, or the main limiting soil feature is given. Soils to be used as a source of road fill or topsoil are rated good, fair, or poor.

The ratings in Table 5 for various uses are followed by numbers that refer to the limiting soil characteristics, which are the reasons for a moderate or severe rating. Occasionally, ratings of slight are also followed by a number. For example, the bottomland soils of Knox County are rated to have slight limitations for intensive cropping, but the number 4 follows the rating to indicate or call attention to the flood hazard.

The soil properties considered in making the ratings for each use in Table 5 are discussed briefly in the following paragraphs.

Intensive cropping ratings are based on the ability of the soils to produce crops commonly grown in the county on a nearly continuous basis without damage to the soil or the environment. Some of the factors considered are permeability, slope, erosion hazard, and depth to bedrock.

Drainage is the removal of excess surface and subsoil water from the soil fast enough to prevent crop damage. Seasonal high water table, permeability, and flooding or ponding affect drainage.

Septic tank absorption fields are areas needed to provide distribution of septic tank effluent into the soil without hazard to health or property. Factors considered in the rating are seasonal high water table, flooding or ponding, slope, permeability, and depth to bedrock.

Sewage lagoon areas are reservoirs that hold sewage until natural decomposition renders it harmless to health. Seasonal high water table, slope, flooding or ponding, seepage, and depth to bedrock are considered.

Dwellings with basements are affected by such soil properties as seasonal high water table, flooding or ponding, shrink-swell potential, strength to support a load, erosion hazard, slope, soil slips, and depth to bedrock.

Local streets and roads ratings are based on soil characteristics that affect the construction and maintenance of streets and roads: seasonal high water table, flooding or ponding, slope, susceptibility to frost heave, shrink-swell potential, strength to support a load, soil slips, and depth to bedrock.

(continued).

Local roads and streets	Pond sites		Recreation		Suitability as a source of	
	Reservoir areas	Embankments, dikes, and levees	Picnic areas	Playgrounds	Road fill	Topsoil
Severe 10, 11	Seepage 19	Low strength 11	Slight	Moderate 1	Severe 9, 10	Good
Severe 4, 6, 10, 11	Seepage 19	Low strength 11	Moderate 6	Moderate 6	Poor 9, 10	Good
Severe 10, 11	Seepage 19	Low strength 11	Slight	Moderate 1	Severe 9, 10	Good
Severe 4, 6, 10, 11	Seepage 19	Low strength 11, 12	Moderate 4, 6	Moderate 4, 6	Poor 10, 11	Good
Severe 4, 6, 10, 11	Seepage 19	Low strength 11, 12	Moderate 4, 6	Moderate 4, 6	Poor 10, 11	Good
Severe 4, 10, 11	Seepage 19	Low strength 11, 12	Moderate 4	Moderate 4	Poor 10	Good
Severe 4, 6, 10, 11	Seepage 19	Low strength 11, 12	Moderate 4, 6	Moderate 4, 6	Poor 10, 11	Good
Severe 4, 6, 10, 11	Favorable	Low strength 9, 10, 11	Moderate 4, 6	Severe 4, 6	Poor 10, 11	Good
Severe 4, 5, 10, 11	Favorable	Compressible 9, 13	Severe 4, 5, 15	Severe 4, 6, 15	Poor 5, 10, 11	Poor 5, 15
Severe 4, 5, 10, 11	Favorable	Low strength 10, 11	Severe 4, 5	Severe 4, 6	Poor 5, 10, 11	Poor 5

Pond reservoir areas are the storage areas of a pond. The dam or earth fill is not considered here. The reservoir area is rated according to slope, depth to bedrock, and the ability of the soil to prevent seepage.

Pond embankments, dikes, and levees ratings are for soil material used in construction of dams or earth fills, dikes, and levees. Shrink-swell potential, strength to support a load, compressibility, piping, erosion hazard, slope, and depth to bedrock are the factors considered.

Picnic areas for recreation are subject to heavy foot traffic and some vehicular traffic during the season of use. It is assumed that little site preparation is required. Factors considered include the nature of the soil surface (not sticky when wet and dries quickly), the seasonal high water table, flooding or ponding, too slow permeability, and slope.

Playgrounds are recreational areas developed for athletic fields and organized sports such as baseball. These areas are subject to heavy foot traffic and thus need good drainage, a low water table, minimum slope, and a soil surface that is not sticky when wet and that dries quickly.

Road fill is rated on the basis of material that is borrowed from areas, moved to a construction site, and used as fill for roads or building sites. Factors considered are the material's susceptibility to frost heave, seasonal high water table, shrink-swell potential, strength to support a load, slope, difficulty of reclaiming borrow areas, and depth to bedrock.

Topsoil sources are rated on the quality of the material to be used as a topdressing for lawns, earth fills, road cuts, and gardens for reestablishment, maintenance, or improvement of adapted vegetation. The kind of soil material (not sticky when wet and dries quickly), the seasonal high water table, slope, difficulty of reclaiming borrow areas, thickness of suitable soil material, and the presence of bedrock at a shallow depth are the factors considered.

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CC

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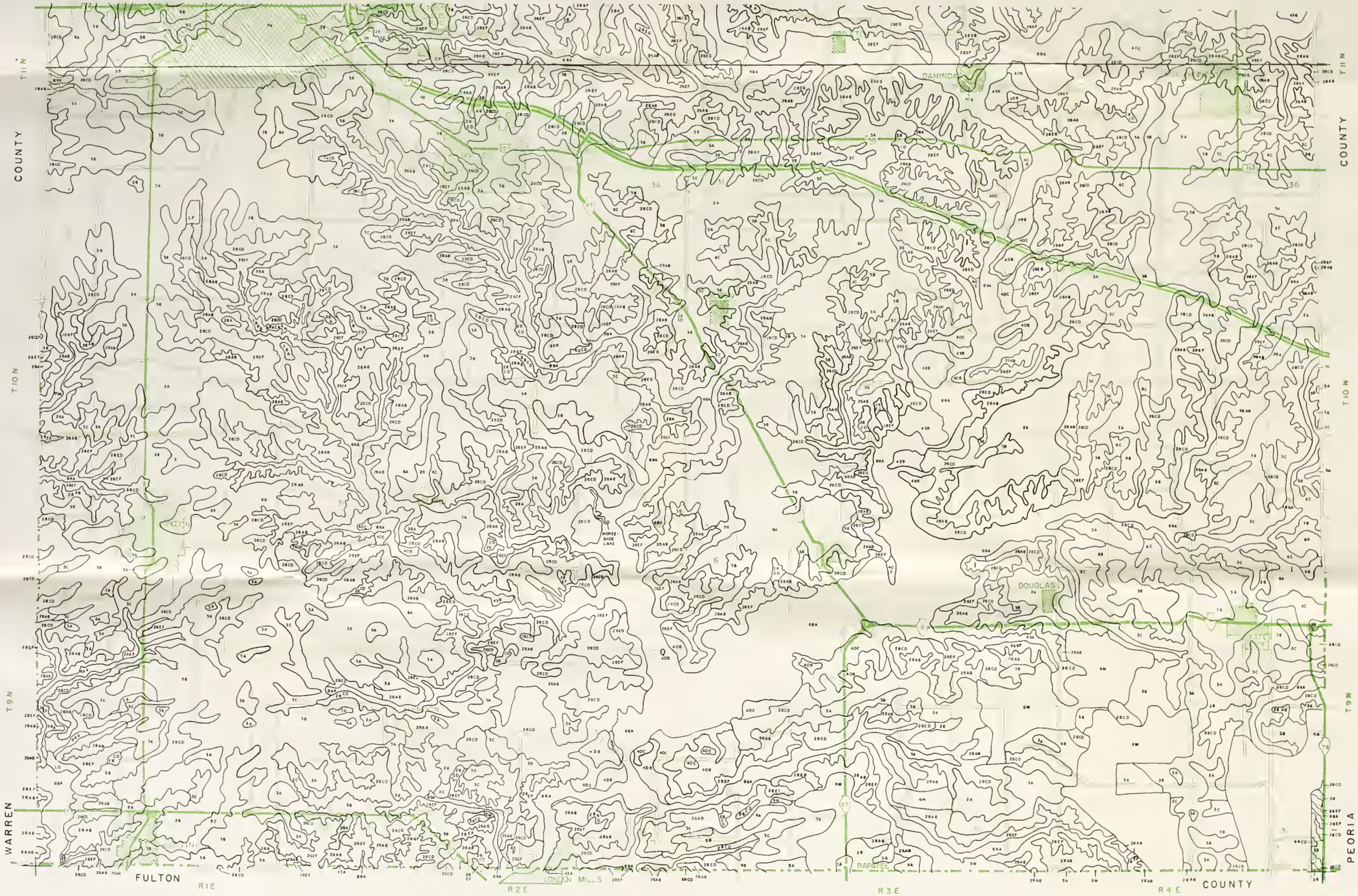
GENERAL SOIL MAP OF KNOX COUNTY, ILLINOIS

SOUTH SHEET



0 1 2 3 4

Scale in Miles

ILLINOIS AGRICULTURAL EXPERIMENT STATION
in cooperation with
USDA, SOIL CONSERVATION SERVICE
1976

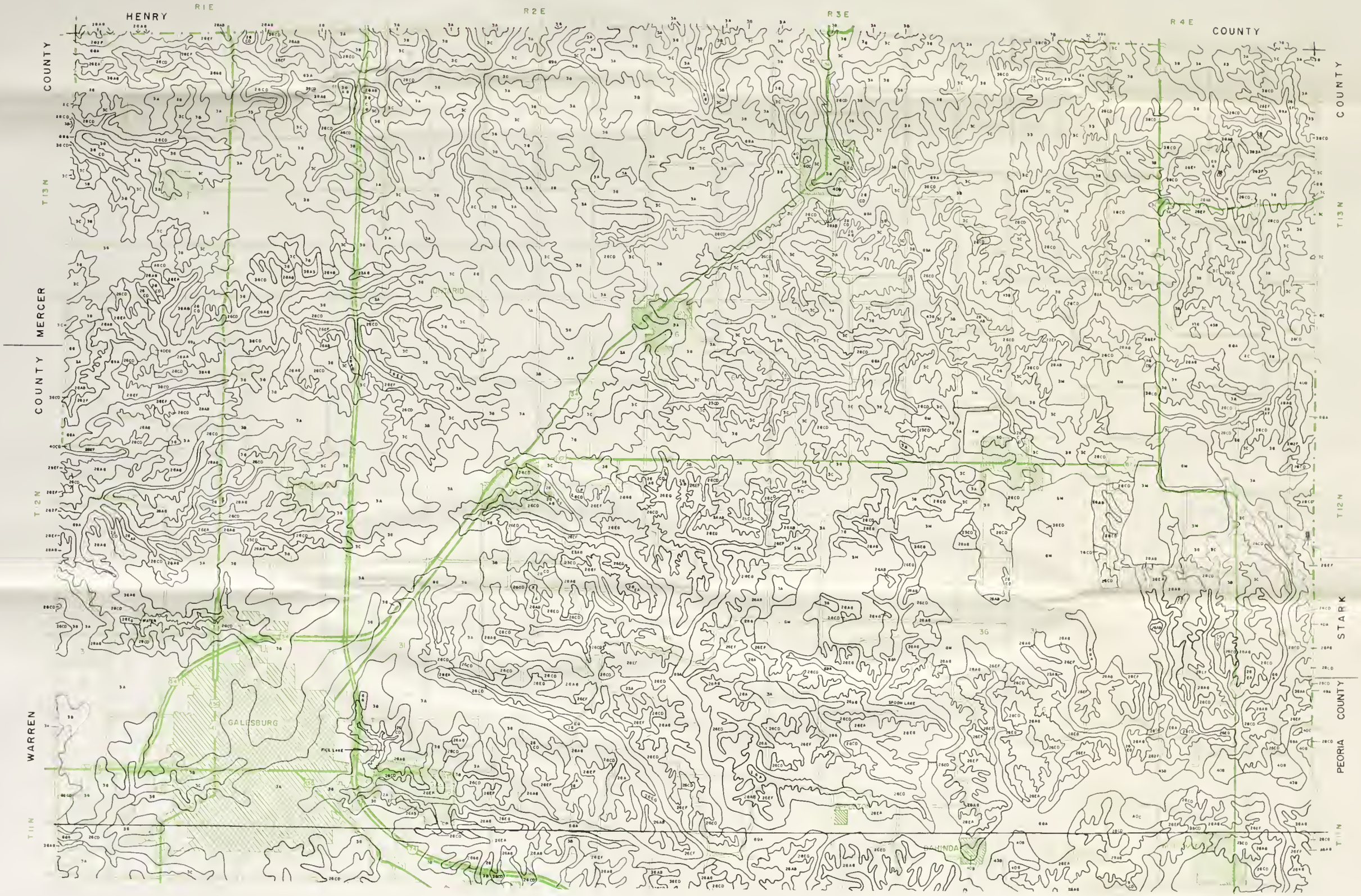
LEGEND — SOIL ASSOCIATIONS

3A	IPAVA SABLE, 0-2% SLOPES	26AB	KEOMAH-CLINTON-CLARKSOALE, 0-5% SLOPES	40C	ST. CHARLES-CAMOEN, 5-10% SLOPES
3B	IPAVA-TAMA, 2-5% SLOPES	26CO	CLINTON-HICKORY, 5-15% SLOPES	40CD	CAMOEN-ST. CHARLES, 5-15% SLOPES
3C	TAMA-ELKHART-DOWNS, 5-10% SLOPES	26EF	CLINTON-HICKORY-GOSPORT, 15-30% SLOPES	43B	WORTHEN-LITTLETON-RAOOLE, 2-5% SLOPES
26A	KEOMAH-RUSHVILLE-CLARKSDALE, 0-2% SLOPES	26EG	HICKORY-GOSPORT-CLINTON, 15-> 30% SLOPES	69A	LAWSON-HUNTSVILLE-ORION, 0-2% SLOPES
		40B	ST. CHARLES-BATAVIA, 2-5% SLOPES		

SM STRIP MINED LAND LF LANDFILL CP CLAY PIT BA BORROW AREA LQ LIMESTONE QUARRY

GENERAL SOIL MAP OF KNOX COUNTY, ILLINOIS

NORTH SHEET



0 1 2 3 4

Scale in Miles

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1976

LEGEND — SOIL ASSOCIATIONS

3A	IPAVA SABLE, 0-2% SLOPES	26AB	KEOMAH-CLINTON-CLARKSDALE, 0-5% SLOPES	40C	ST. CHARLES-CAMDEN, 5-10% SLOPES
3B	IPAVA-TAMA, 2-5% SLOPES	26CD	CLINTON-HICKORY, 5-15% SLOPES	40CD	CAMDEN-ST. CHARLES, 5-15% SLOPES
3C	TAMA-ELKHART-DOWNS, 5-10% SLOPES	26EF	CLINTON-HICKORY-GOSPORT, 15-30% SLOPES	43B	WORTHEN-LITTLETON-RADDLE, 2-5% SLOPES
26A	KEOMAH-RUSHVILLE-CLARKSDALE, 0-2% SLOPES	26EG	HICKORY-GOSPORT-CLINTON, 15-> 30% SLOPES	69A	LAWSON-HUNTSVILLE-ORION, 0-2% SLOPES
		40B	ST. CHARLES-BATAVIA, 2-5% SLOPES		

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